COMMERCIAL FERTILIZER

CONSOLIDATED WITH THE FERTILIZER GREEN BOOK

WORRIED ABOUT FERTILIZER PRODUCTION COSTS?

The fertilizer sales picture today calls for the closest attention to reducing production costs. It requires higher efficiency in formulating all mixed goods.

PLANNING HIGHER AMMONIATION TO IMPROVE CONDITION?

One of the best and cheapest ways to add nitrogen and improve physical condition is to ammoniate superphosphate at higher rates. This requires special attention to cooling and drying.

TO GET TOP-NOTCH TECHNICAL HELP

Arcadian

PRODUCTS

Nitrogen Solutions (Nitrana® and Urana*)

•

ARCADIAN® Nitrate of Soda

•

A-N-L® Nitrogen Fertilizer

•

Urea Products

•

Sulphate of Ammonia

*Trade-mark

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Atlanta 3, Ga. • Columbia 1, S. C. • San Francisco 3, Calif.

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AA Quality...

for over 85 years
a symbol of quality
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Mining phosphate rock at A.A.C. Mines, Pierce, Florida.

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AA QUALITY Ground Phosphate Rock
All grades of Commercial Fertilizers
Superphosphate — **Sulphuric Acid**
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Phosphoric Acid and Phosphates
Phosphorus and Compounds of Phosphorus
Fluosilicates — **Salt Cake**
Gelatin — **Bone Products**
Ammonium Carbonate

The AMERICAN AGRICULTURAL CHEMICAL Co.

GENERAL OFFICE: 50 CHURCH STREET, NEW YORK 7, N.Y.

31 FACTORIES AND SALES OFFICES, SERVING U. S., CANADA AND CUBA—ASSURE DEPENDABLE SERVICE

HOW DOES Business YOUR ~~GARDEN~~ GROW?

Your business as a fertilizer manufacturer grows best when the farmer's crops grow best. And the growth of both is stimulated by the same outstanding Fertilizer ingredient . . . Organic Nitrogen.

There is no better source of Organic Nitrogen than SMIROW TANKAGE. It is 100% natural organic. It is consistently high in water insolubility and availability, testing approximately 90%. SMIROW TANKAGE is uniform both in color and texture.

The sure way to make your sales grow is to see that correct proportions of SMIROW TANKAGE assure the top quality that farmers seek in your goods.

• *We will gladly send samples and prices.*

SMIROW TANKAGE

MAKES PLANTS GROW

SMITH-ROWLAND COMPANY

NORFOLK, VIRGINIA • CHEMICAL, ILLINOIS

The two Greatest Insecticide Successes since DDT

aldrin

IN JUST A FEW SHORT YEARS aldrin has established an outstanding insecticide record. Its fast action against major crop pests has protected farm production and its low cost has meant widespread usage on many crops.

Soil Insects

For example, the control of underground insects has now become economically possible with the development of aldrin. Aldrin is unsurpassed for the control of major soil pests.

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rootworms
wireworms
white grubs
chinch bugs
green June beetle larvae
European chafer grubs
sugar beet maggots
Japanese beetle larvae

Grasshoppers:

From the test tube on, aldrin has been the international "hopper-stopper." Whether halting the attacks of these voracious crop-eaters in North America or ending the famines caused by its cousin, the locust, in the Middle East, nothing approaches the incredible 99% control of just *ounces* of aldrin *per acre*.

Cotton Insects

And aldrin has been a boon to King Cotton! Its fast and low-cost control of the boll weevil has boosted yields and profits for thousands of growers.

dieldrin

Dieldrin leads the parade of those organic insecticides which have long residual action. And it controls a very wide variety of insects. For that reason, dieldrin is a fine stock item to meet the needs of growers *around the year*. Here are a few examples of dieldrin's versatility:

Cotton boll weevil · thrips cutworms · plant bugs	**Turf Insects** ants · Japanese beetle larvae white grubs · chinch bugs
Public Health Pests houseflies · mosquitoes fleas · ticks	**Vegetables** tuber flea beetles · leaf miners onion thrips · root maggots
Fruit plum curculio "catfacing" insects	**Cereal and Forage Crops** armyworms · alfalfa weevil chinch bugs

Aldrin and dieldrin can be formulated into dusts, wettable powders, emulsible concentrates, and granules—all common formulations. Your sales of these insecticides are backed by State and Federal recommendations, the finest of technical service, and a comprehensive advertising campaign. You'll find them good products to offer to your customers.

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COMMERCIAL FERTILIZER

ESTABLISHED 1910 — January, 1954

Vol. 88 No. 1

ADVERTISING INDEX

Albemarle Paper Manufacturing Co., The 32
Allied Chemical & Dye Corp., Nitrogen Division ..... Front Cover
American Agricultural Chemical Co. ..... Inside Front Cover
American Limestone Co. 70
American Potash & Chemical Co. 53
American Vermiculite Company, Inc. 80
Aquafil Company 24
Armour Fertilizer Works 55
Ashcraft-Wilkinson Co. 55-60
Atlanta Utility Works 80
Automatic Scale Co., Inc. 14
Bagpak Division (International Paper Co.) 68
Baker & Bro., H. J. 14
Baughman Mfg. Co. 15-79
Bemis Bro. Bag Co. 59
Berkshire Chemicals, Inc. 71
Blaw-Knox Co., Blaw-Knox Equipment Division 8
Bradley Pulverizer Co. 62
Butler Manufacturing Co. 17
Chase Bag Company 77
Charlotte Tank Corp. 16
Chemical Constructions Corp. 80
Cole Manufacturing Co., R. D. 61
Davidson-Kennedy Co. 64
DeBardeleben Coal Corporation 62-75
Dings Magnetic Separator Co. 9
Duval Sulphur & Potash Co. 60
Equitable Paper Bag Co., Inc. 77
Evans Metal Co. 16
Exact Weight Scale Co., The 80
Fertilizer Equipment Sales Corp. 61
Fulton Bag & Cotton Mills 64
Gascoyne & Co., Inc. 62-75
General Industrial Development Corp. 9
Grace Chemical Company 77
Hammond Bag & Paper Co. 7
Harte and Co., John J. 43
Highway Equipment Co. 35-36
Hough Co., The Frank G. 49
Hudson Pulp and Paper Corp. 18
Industrial Marking Equipment Co., The 68
International Minerals & Chemical Corp. 68
International Paper Co. (Bagpak Div.) 68
Johnson Company, C. S. 31
Koppers Co. (Tar Products Div.) 80
Kraft Bag Corp. 47
Law and Co., Inc. 57
Lion Oil Co. 49
Link Belt 12
McIver & Son, Alex M. 72
Marietta Concrete Corp., The 73
Mathieson Agricultural Chemical Co., Div. Mathieson Chem. Corp. ..... Front Cover
Monsanto Chemical Company (Inorganic Div.) 71
National Lime and Stone Co. ..... Inside Back Cover
Nitrogen Division (Allied Chemical & Dye Corp.) 71
Phillips Chemical Co. 54
Piedmont Chemical Co. 65
Potash Co. of America 11
Quaker Oats Co., The 50-51
Raymond Bag Co., The 4-5
Sackett & Sons Co., The A. J. 3
Shell Chemical Corporation 77
Smith-Rowland Co., Inc. 54
Southern Fert. & Chemical Co. 63
Southern Lead Burning Co. 39
Southern States Phos. and Fert. Co. 39
Southwest Potash Corporation 39
Spencer Chemical Co. 54
Stedman Foundry & Machine Co. 65
Sturtevant Mill Co. 74
Tennessee Corporation 46
Texas Gulf Sulphur Co. 80
Tull Metal & Supply Co., J. M. 59
Union Bag & Paper Corp. 77
Union Special Machine Company ..... Back Cover
United States Potash Co., Inc. 69
United States Steel Corp., (Subsidiary, Coal Chem. Sales Div.) 13
Universal Detergents, Inc. 74
Virginia-Carolina Chemical Corp. 46
Wiley and Company 80
Wiley & Sons, Inc., John 59
Willingham-Little Stone Co. 77
Woodward & Dickerson, Inc. 77

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In This Issue

Just Around the Corner, by *Vernon Mount* 10
TVA Reveals new Super Concentrate 19
It Seems to Me by *Bruce Moran* 19
Industry Calendar 19
How to Sell More Fertilizer, by *Wm. A. Albrecht* 20
AROUND THE MAP
- Naco's Pushbutton Plant 28
- Warner-Price New Del-Mar Factor 30

Grange and APFC Sponsor Contest 34
Some ASA-SSA Echoes 37
SAFETY
- List of Executive Committee 40
- Potential Fluorine Hazard, by *Walter H. Poppe, Jr.* 42

Personals 48
Obituaries 50
GPFES Honors Strobhar 52
Markets 63
Pesticides 64
Southern Lead's New Plant 78
Classified 80

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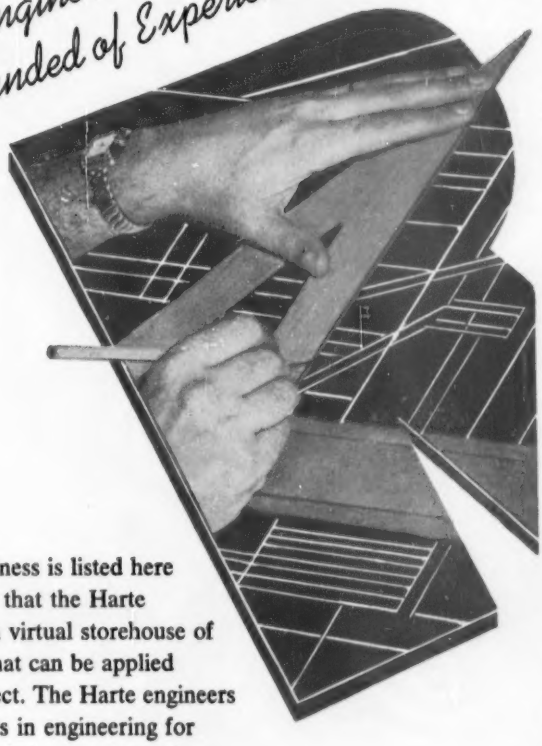

- SINGLE SUPERPHOSPHATE PLANTS
- TRIPLE SUPERPHOSPHATE
- AMMONIUM SULPHATE PLANTS
- NITRIC ACID
- STORAGE BUILDINGS
- NITRIC ACID ACIDULATION
- NITROPHOSPHATE PLANTS
- INSECTICIDE PLANTS
- SULPHURIC ACID
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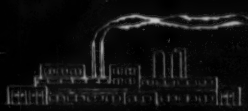
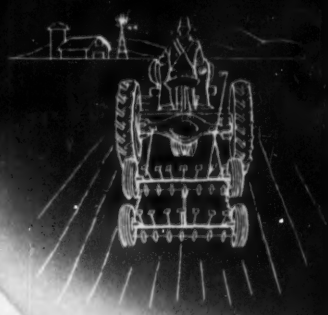
coming into view . . .

GRACE CHEMICAL COMPANY





A new $20,000,000 urea and anhydrous ammonia plant near Memphis, Tenn., is progressing rapidly toward completion. Indications are that production will be available to the industrial and agricultural communities by the second half of 1954. This means that *NOW* is not too early for users of urea and ammonia to explore this new source of supply.

UREA AND ANHYDROUS AMMONIA FOR INDUSTRY AND AGRICULTURE

At the moment, Grace Chemical Company is acquainting these markets with its strong team of executive, technical, and production personnel. Also with the modern processing techniques of the new plant. Personnel and plant will be combined into a smooth-functioning, efficient organization—backed by a world of experience. If you have not seen the new illustrated brochure, "Introducing Grace Chemical Company," send the coupon with your business letterhead for your copy today.

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JUST AROUND THE CORNER

By Vernon Mount

WATCH BOB WAGNER, son of the late great Bob, who just went in as Mayor of New York City--a major stepping stone, and probably the best springboard to the White House. He is a strong hope for the future of the Democrats.

FARM LAWS won't make much progress this session of Congress. They are confusing to the farmer, and what confuses a farmer he fears. And farmers are a big slice of the vote.

STRIKES AHEAD will show the new Government hands-off policy. There'll be a lot of them, and they'll be tough because Management has had enough of giving way to Labor.

POLITICALLY, a rough year lies ahead, with the scrap for control of Congress and groundwork for 1956. ECONOMICALLY, we'll be getting back to boom times, with the super-boom fading. Business will be good, except by super-boom standards.

INTERNATIONALLY, Russia will keep her whip-hand position of threat to world peace, and her purges will continue. No telling who is next, so no telling what policies will be. The army is in the saddle now. Meanwhile France drags her feet on plans vital to her own safety.

HAPPY NEW YEAR to all...because we can be happy in 1954, if we just get used to living in troubled times, and recognize them as a new normal.

Yours faithfully,

Vernon Mount

All commercial fertilizers look alike until they are packed in smart, attractive, eye-appealing Shipping Sacks — RAYMOND MULTI-WALL PAPER SHIPPING SACKS.

Raymond Shipping Sacks are made of specially prepared Kraft paper, printed in brilliant colors, and CUSTOM BUILT to the fertilizer packers' and shippers' special requirements.

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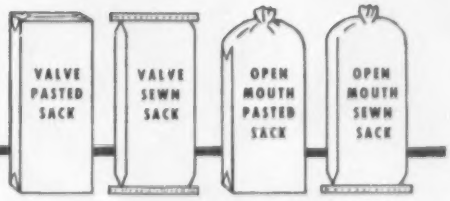
Give your products better protection, more sales appeal, and customer satisfaction—pack and ship your fertilizers in RAYMOND MULTI-WALL PAPER SHIPPING SACKS! Prompt service assured.

THE RAYMOND BAG COMPANY
Middletown, Ohio

Illustrated below are the four leading types of Raymond Multi-Wall Paper Shipping Sacks. They are available printed in one or more colors or plain. A Raymond representative will be glad to assist in selecting the perfect Shipping Sack for your particular requirements.



RAYMOND *Custom Built* *Multi-Wall* PAPER SHIPPING SACKS

Marietta

GREATEST NAME IN SILOS

helps you KEEP PACE with the increasing demands of industry!

MARIETTA Concrete Silos and Storage Systems are designed to meet the specific needs of diversified industries. A permanent MARIETTA storage system, although geared for the future with built-in design flexibility, is capable of meeting industry's ever-increasing demands.

MARIETTA gives you large capacity storage for efficient, economical materials-handling and eliminates the need for drawing from ground storage.

There is no limit to the equipment that can be incorporated into a MARIETTA silo wall, floor or roof. Design flexibility is a fundamental feature purposely engineered into all MARIETTA Silos to provide for any efficient discharge or servicing system.

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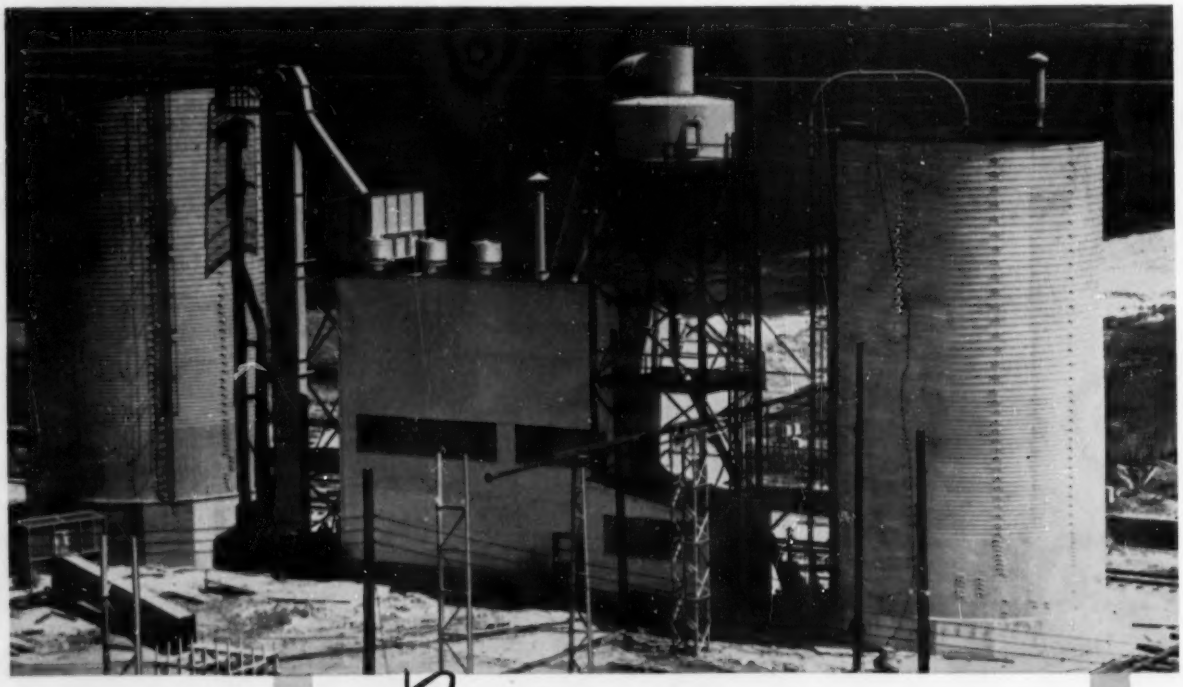

A modern industrial storage system especially designed and erected by Marietta. Texas City Chemical Co., Texas City, Texas.

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MARIETTA, OHIO

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Successful Farming
The Progressive Farmer
JANUARY, 1954
"You can double pasture production with 10-10-10 fertilizer"
Stockman's Notebook
Pastures hard hit by drought can be restored with high-nitrogen fertilizers

United States Steel

is helping you sell high-nitrogen fertilizers

UNITED STATES STEEL is actively promoting the use of high-nitrogen mixed fertilizers through advertisements in leading farm publications. This month, well-known soil authorities offer timely suggestions as to the use of nitrogen and complete fertilizers to rehabilitate barren pastures for rich spring growth. They point out the importance of applying this fertilizer as early as possible.

You can help increase your dealer sales by concentrating sales effort to tie in with the nitrogen promotion campaign . . . it will certainly increase the demand for high-nitrogen mixed fertilizers. Make certain that your dealers will be supplied with plenty of 8-8-8 and 10-10-10 to meet this profitable demand.

Farmers have confidence in United States Steel products. Produce your high-nitrogen mixed fertilizers with U·S·S Ammonium Sulphate and make that fact known to the farmers . . . it will help increase your sales.

Get full information on U·S·S Ammonium Sulphate from our nearest Coal Chemical sales office, or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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4-212

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AMMONIUM SULPHATE NITRATE

26% NITROGEN

supplies the 2 key forms of nitrogen

Contains 6½% nitrate nitrogen — quick acting for early, vigorous growth. Contains 19½% ammonia nitrogen — slower acting for sustained growth through to harvest time.

easy to use

Pelletized and properly sized for flow. Easy to handle, ready to use for top dressing, side dressing and irrigation.

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A Better Multiwall Valve Bag FOR LESS!

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LOWER BAG COSTS... You'll save up to $3.25 per thousand.

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UNIFORM WEIGHTS... stop over-packing.

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CUSTOMER SATISFACTION... no loose, torn sleeves to get into the farmer's drill.

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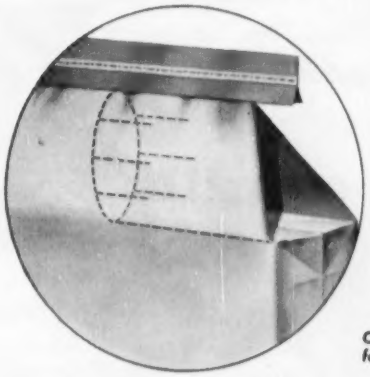
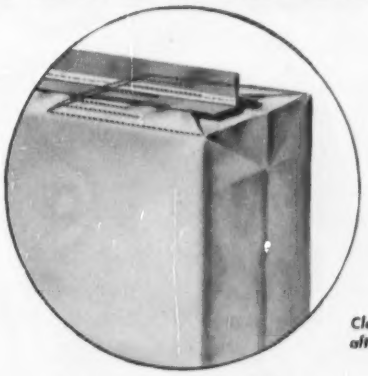
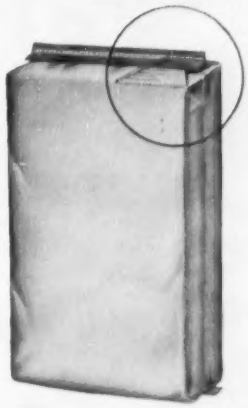


Open... for filling

The FLEX Does the Trick...



Closed... after filling



EXACT WEIGHT Sacking Scales
Cut Labor Costs... Eliminate Over-weights

One simple operation does the work of three with the EXACT WEIGHT Sacking Scale. One man can bag, weigh, and check over 100 tons of bulk, free-flowing chemicals per day from overhead hopper to foot-level conveyor. The saving in labor costs, together with the saving from elimination of over-weights, can pay for the installation.

Simple to operate, the EXACT WEIGHT Sacking Scale has only two controls. It takes just four easy motions to attach a bag, fill it, weigh it, and release to conveyor. Built for hard service with agate bearings set in metal, alloy-steel pivots with hard chromed finish, and fittings of stainless steel and brass. Scale will handle multi-wall paper, paper-lined cotton, or burlap bags. Available with automatic valves. Write for full details today!

Exact Weight Scales

Better quality control
Better cost control

THE EXACT WEIGHT SCALE COMPANY

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SALES and SERVICE
in all principal cities
from coast to coast and
Canada

The market for

CHEMICAL FERTILIZERS

grows bigger... and bigger...

In Wisconsin where the average yield is about 60 bushels of corn per acre, 162 farmers, following a fertilizer prescription provided by the Soils Department of the University of Wisconsin in 1952, averaged 124 bushels per acre, some obtaining 150 bushels or more. Other crops would respond in the same way.

When farmers learn that a dollar invested in fertilizer brings a three dollar return, they will find a way to buy a lot of fertilizer.

More yield per acre will provide the food for the country's increasing population.

Plan now for tomorrow's market with Chemico . . . the leading designer of plants for the production of

- **AMMONIA**
- **UREA**
- **PHOSPHORIC ACID**
- **HIGH STRENGTH PHOSPHATIC FERTILIZERS**
- **NITROGENOUS FERTILIZERS**

as farmers learn it pays to fertilize heavily

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phosphate
For the manufacture of industrial chemicals.

phosphate
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phosphate division

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General Offices: 20 North Wacker Drive, Chicago 6

International phosphates for industry and agriculture

Clay W. Penick

New Super Concentrate Revealed by TUA

A new, super-concentrated fertilizer, made from air, phosphorus and ammonia, which provides more than twice as much plant nourishment as some present fertilizer mixtures was described by three Tennessee Valley Authority chemists at the American Chemical Society's regional conclave December 11.

The fertilizer — a white, fluffy powder—contains a total of 97 per cent plant nutrients, according to J. C. Driskell, F. A. Lenfesty and Dr. Grady Tarbutton of the TVA's Division of Chemical Development, Wilson Dam, Ala. The new fertilizer is made by burning phosphorus in air and combining the resulting phosphoric oxide with ammonia gas, explained Mr. Lenfesty, who presented the report. It contains about 17 per cent nitrogen and 80 per cent of a phosphorus compound, the speaker reported.

Small-scale greenhouse tests indicate that the new fertilizer has a slight superiority over the nitrate-superphosphate mixture in residual effects. Tests conducted at the TVA laboratory during the summer showed that the new fertilizer does not absorb water from the atmosphere under the prevailing conditions of humidity and temperature, Mr. Lenfesty continued, so does not cake.

"This is still a laboratory product which has not yet been made on a large scale," he emphasized. "The process, however, has been reproduced consistently in repeated runs in the laboratory. Before the material can be completely evaluated, it will be necessary to obtain a sufficient quantity to permit large-scale agronomic testing as well as bag storage and drillability tests. We feel that the process has great promise and that it should be thoroughly investigated on a pilot-plant scale."

It Seems to Me

by BRUCE MORAN

This is to introduce Clay W. Penick, who has joined our staff and whom you will be seeing in your plants and at conventions. Let me give you something of his background:

Clay was born in Atlanta and went to Emory University, where he took an AB in Journalism. He had barely begun to use this knowledge when the Navy took him over, and kept him at the study of electronics for quite a while before he saw active service

Ten years ago he came out of uniform, and entered business. He earned his way up to a District Managership, which he resigned to join us. All of which will stand him in good stead in his work with us . . . even the electronics, which may well, soon, play a part in our industry bigger than it does today.

Clay is married and has one daughter. They will make their home in Atlanta.

INDUSTRY CALENDAR

Date	Organization	Place	City	State
Jan. 11-13	Sou Weed	Peabody	Memphis	Tenn.
Jan. 14-15	Cotton	Peabody	Memphis	Tenn.
Feb. 1-3	Sou Ag		Dallas	Texas
Feb. 19	Joint Ag-Ind	Palmer House	Chicago	Ill.
Feb. 19	Can. A.C.A.	Royal York	Toronto	Canada
March 7-9	Sou Safety	Brown Hotel	Louisville	Ky.
May 4-6	N. C. Safety		Raleigh	N. C.
May	Va. Safety			Va.
May	Md. Safety			Md.
June 10-12	APFC	Homestead	Hot Springs	Va.
June 14-16	NFA	Greenbrier	White Sulphur	W. Va.
July 20-22	Pacific Conference	Klawath Falls AE		Oregon
Nov. 10-12	NFA	Hollywood Beach Hotel	Hollywood	Fla.
Nov.	CFA			Cal.

How to Sell More Fertilizer

by
Wm. A. Albrecht, Chairman,
Department of Soils
University of Missouri

SOME NEGLECTED ASPECTS OF SOIL AND NUTRITION

When we learn to make fertilizer serve the soil better, and the soil serve the plant better, and the plant serve the animal better, we will sell more fertilizer. That is, in essence what Dr. Albrecht is saying in this scholarly treatment of a subject which he presents as a challenge to the industry, a challenge he feels sure fertilizer men will accept as part of their responsibility. This paper was based on one Dr. Albrecht presented at the recent CFA Convention.

Fertilizers are a help in the better management of our soils for more efficient crop production. However, while we manage soils and crops for larger monetary returns, we must also manage them for better nutrition, better health and better multiplication of our soil microbes, our plants, our animals, and ourselves. We nourish our plants, while aiming for more vegetative bulk or more bushels. We nourish our animals, while hoping for more gain in weight, much of which is water and fat. We nourish ourselves, with ever-impending danger of too much fat and of the degenerative diseases. Such is our nourishment because of the absence of the fuller appreciation of the basic fact that the nutrition of all life forms is dependent on the fertility of the soil.

When food and feed are now accorded increased attention because of the mounting human population, but under declining combined populations of sheep, pigs, and cattle, why should we not turn our soil-improving efforts via fertilizers, and all else, toward the production of more proteins? Now that the production of carbohydrates bulk for filling and fattening has become a disappointing criterion for our agricultural efforts in production—and in maintaining healthy animals and people—isn't it high time to direct our aims in production toward growing more proteins? Should this not be the aim when these widely deficient food components, especially in their complete array of essential amino acids, represent, (a) growth in terms of cell multiplication (not just water-logging and fattening); (b) protection against "diseases," that is against invasions by foreign proteins; and (c) fecund reproduction for maintenance of the species? In our use of fertilizers, then, we must focus attention on making those soil treatments connect the soil more specifically with the most complete nutrition in which the soils and fertilizers can possibly function. Under this as a newer criterion for the services by fertilizers, the industry centered around these commodities will render a larger service for others and itself by assuming the responsibilities of studying nutrition in its broadest sense. Nutrition must be studied not only in terms of carbohydrates and calories, but also in its fullest significance for **growth, protection,** and **reproduction** of microbes, plants, animals, and man, or for the entire biotic pyramid of which the fertility of the soil is the foundation.

Fertilizers and their functions in the soil will be better understood when many basic facts about soils, their chemodynamics in terms of their contents of both secondary and primary nutrient elements, their mineral reserves, the synthetic food services by crops, and the whole ecological pattern of all life in relation to the climatic-fertility pattern of our country, for example, are more clearly comprehended. Fertilizers will be better understood, and more wisely used, also, when some mistaken concepts are eliminated, and when practices in soil management can be built on what is truly soil science. Only critical research will weed out the erroneous practices more rapidly and put our own agricultural survival on higher security. Listed and outlined herewith, rather than discussed in detail, are some basic facts connecting the nutrition of all forms of life in the biotic pyramid closely with soils, more particularly via the proteins which are so universally deficient and are becoming more costly.

Some basic facts of soil science connecting fertilizers and soils with better nutrition

Our national fertility pattern resulting from our climatic pattern gives corresponding pattern to crops.

More clay in the sand in these glass dishes (left to right) was "protection" against the fungus disease.

More clay, that is, more adsorption and more exchange capacity, and thereby better plant nutrition, "protected" the plants against acidity, pH 4.4.

Interpreting the soil conditions in terms of the amount of exchange capacity and the relative ionic saturations of it simplifies the problem of using fertilizers wisely in relation to soil tests.

livestock, nutrition, health and other aspects of all life whereby it puts the soil in control. The varied concentration of farms in the different regions of the United States outlines the varying chemodynamics of the soil for nutrition in a pattern duplicated, for example, by that of the radio efficiency; namely, more farms are in the same areas with better radio service. When it is the fertility salts of the soil that are both the soil's conduction of electricity and the soil's production of crops, shall we not see the variable chemodynamics of the elements of soil fertility responsible for both the better crops, and the better radio transmission, to say little about the better physiological settings for higher forms of life?

The patterns of these activities are determined by the pattern of the climatic forces (rainfall and temperature) as they have been decomposing the soil minerals to keep the stream of nourishment flowing for our feeds and foods of higher protein values for better maintenance of all life. Shall we not connect the soil more directly with nutrition as we study and come to appreciate these larger national patterns?

Plant nutrient elements and compounds adsorbed on and exchangeable from the soil colloids—and not necessarily in aqueous solution—are the fertility "available" to the plant roots. The clays, i.e., the colloidal fraction, of the soil are the seat of these chemodynamics. The nutrient elements are adsorbed there from the solutions of fertilizers, for example. They are moved from there to the plant roots. Such elements in their soluble forms do not move into the plant root along with the water necessarily because the fertilizer salts containing them are soluble, or so-called "available." Water movement into the root follows one set of laws, nutrient movement there follows another set.

When the clay fraction—a negatively charged colloid—is highly stocked with adsorbed fertility elements, then the soil is nearly neutral in reaction, or it is not very acid. More acidity in a soil means merely less fertility per unit of colloid. Increasing acidity in our natural soils is, therefore, simply decreasing fertility. The presence of the hydrogen is not the detriment. Instead some hydrogen or some acidity is a benefit in connection with fertility. It "mobilizes" the nutrient cations. It will help the acid clays in their "processing" of the reserve minerals to make them become more "available." It helps some soils to "recuperate" when we give them a rest.

The acidity, or hydrogen, resulting from the respiration of the root, exchanges itself to the clay for other cations, i.e. positively charged ions, of nutrient service to the plants. The acid on the clay breaks down the reserve minerals to move more nutrient ions from there to the clay and from there on to the roots. Acidity, then, is the chemodynamic power within the soil (but of sunshine origin above the soil) to keep the fertility assembly line of agricultural production running for full output.

Measuring the exchange capacity and the stock of adsorbed nutrients in it gives more logical concepts of soil fertility and plant nutrition from it. More clay, i.e. more colloids, in our "heavier" soils gives them more adsorption capacity and more exchange capacity. Thereby it gives them more potential productivity. More clay means more fertility even if in company with a high degree of acidity, hence good plant nutrition is offered on "heavy" soils in spite of low pH values. Our "fight" on soil acidity has been a "blind alley." Our use of gadgets to measure acidity and our devotion to the gadgetry has delayed the realization of the failing plant nutrition brought about by the serious fertility deficiencies. Our concern about soil alkalinity will probably find some relief when we study it under a concern about fertility shortage for the crop more than a dangerous degree of alkaline reaction, as the chemist—not the plant root—views it.

Organic molecules, as additional cations adsorbed on the clay and as possible carriers of some anions, are a neglected corridor of our soil fertility researches. Organic matter suggests itself of major import in the case of the so-called "Alkaline Soils." In the humid regions, soil acidity has fortunately been connected with troubles in growing legumes, though not in terms of interpreting soil as nutrition for these protein producers. Clay must be recognized as the major soil separate on, and around, which the activities of the nutrient ions are centered. Silt can provide the reserve nutrient elements to be liberated by the processing of this soil separate by the acid clay. Sand as quartz grains must remain of skeletal service only.

The adsorbed nutrients and their interactions relative to entrance into the plant roots are research areas offering much in better management of plant nutrition. The suite of ions adsorbed on the clay may be considered (a) the stock of fertility to be measured as amounts exchangeable, and (b) the collected activities of the many ions to be interpreted in terms of each ion in relation to "the company it keeps" rather than to the amounts exchangeable. It is the measurement of the activities of the ions that becomes significant

Fertilizers as soil treatments must be nutrition for better body, bone, and reproduction of the animals as well as means of making more crop yields. Nutritional quality as well as quantity of the forage must be considered in judging the results from fertilizer use.

in determining the amounts of nutrients moving into the plant or to be "absorbed" by the plant, as we say it in common language. This fact is suggested by the common emphasis on the many significant "ratios" of the ions "taken" from the soil by plants, and found in the plants according to the chemical analyses of them. The plant is at the mercy of the soil more than vice versa.

Research in soil fertility and plant nutrition needs to consider more than only some inorganic aspects of the soil-root chemodynamics in relation to soil treatments and composition of plants. One-half of the field of soil and nutrition might be considered as neglected in our failure to study the organic compounds which the plant roots may be taking from the soil for nutritional services. To date, we have been studying only the inorganic elements which plants take from the soil. Only the results of "ashing" the plants have been connected with the soil as plant nutrition. We have not considered seriously the plants necessity to synthesize carbohydrates as truly "plant food" for the plant's struggle to synthesize from those carbohydrates the proteins, i.e. the necessary amino acids, required for the plant's own nutrition if it is to survive. When tryptophane and methionine are amino acids synthesized by plants, this performance is not merely a philanthropic service by plants to save our costs of purchased protein supplements for fattening livestock. Shall we not fertilize, then, with the hope of the production of complete proteins for the nutrition of the crops we grow and thereby study the protein deficiencies for the crop's nutrition?

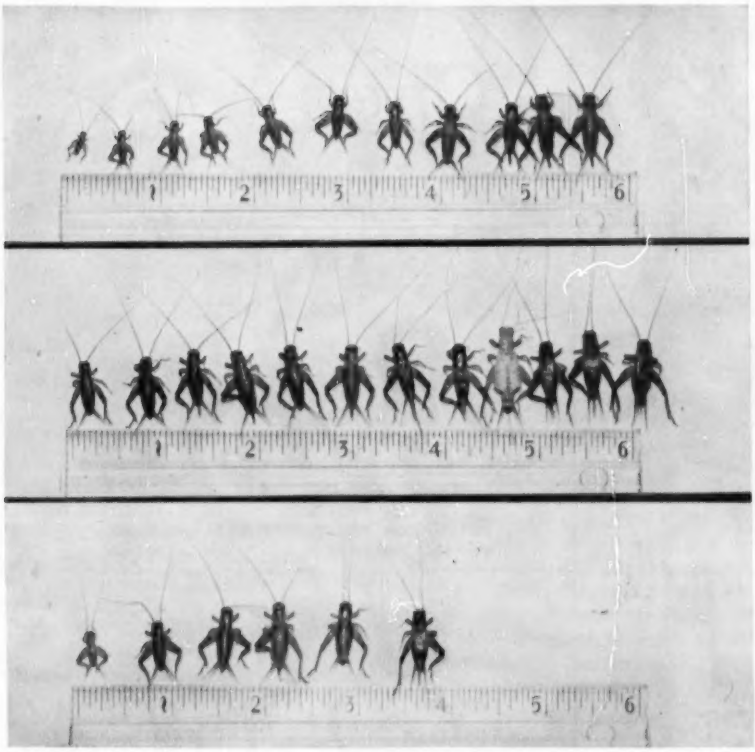
Another portion of the study of soil and nutrition, even in the inorganic phase, is neglected. To date the "solubility" of anions in an extracting reagent is our criterion of anionic behaviors in the soil. We cannot yet measure the exchangeability and the "activities" of the anions as we measure those of the cations in the soil. We have not yet considered the necessary suite of anions. When carbonic acid from the plant root or the microbe provides the bicarbonate anion to exchange for other anions, it is necessary that we develop our concept of how this less active anion can exchange for nitrate, chloride, sulfate, phosphate, silicate, and others of negative charge and of more active behaviors in the soil. The concepts of adsorption and exchange of anions held in the soil still remain to be developed. This half of the inorganic picture of soil and plant nutrition has not yet been painted in detail.

The climatic pattern of the development of the different soils for nutrition in fullest order has too long been viewed only in terms of water for plant use. The climatic pattern of the effects by rainfall in conjunction with those by temperature is more significant in terms of the soil fertility pattern which controls the ecological array of plants that it is in terms of water alone. This soil fertility pattern, that is, the pattern of plant nutrition, gives location to either carbohydrate-producing plants only or those producing proteins too, and those more complete in the delivery of all the essential amino acids required for the nutrition of animals and man. It is a climatic pattern in relation to protein production, more than in relation to any other major factor in nutrition in general. Protein production and the availability of this factor in nutrition is the major ecological factor in any life form.

The ratios of the calcium to potassium and of other elements to each other, control the synthetic services by the crops. The high ratio of calcium to other elements in connection with legume growth is not a matter of calcium as ammunition in the "fight" on soil acidity. Instead, it is a matter of the generous amount of calcium in connection with any of the crops given to synthesis of much protein, and the more generous amounts are required by plants carrying on nitrogen fixation from the atmosphere for good nutrition. According as the climatic forces of the weathering of the soils shift the ratios of the activities of the nutrient elements adsorbed on the clay, so there may be expected to be a shift in the carbohydrate—protein ratios in the plant's composition. A high degree of calcium saturation of the soil's colloidal complex is a requirement for higher protein concentrations in the crops. In considering the fertility requirements to improve our soils, then, the broader basic climatic pattern giving different degrees of soil development or varying saturations of the colloidal clay as suites of ions is a most helpful guide to the necessary fertilizers for efficient plant nutrition.

Accurate diagnosis of the fertilizer needs of the soils, not just sales, has become a new responsibilty of the fertilizer industry. Fertilizer use has become a matter of prescriptions determined by chemical facts (a) about the soil, and (b) about the physiology of the intended crop. It is becoming more and more a problem of providing larger amounts of materials as "sustaining fertility" as well as amounts of standardized "starter fertilizers" per acre limited so as to prevent salt injury to the seedling plants. Soil tests are becoming more common guides in the decisions as to what fertilizer to use. They are leading the farmer to understand, and to be more concerned about, his soil fertility problems. It is that growing concern of the farmer which has increased the fertilizer sales more recently than the clever selling ability of the fertilizer salesman.

"Fertilize for more proteins by all means" may well be the slogan for all of us. The services by fertilizers will increase, and thereby sales of them will increase too, when soil and nutrition are more closely connected by our knowledge of the neglected trace elements functioning in our soils, our crops, our animals, and ourselves. Enzymes, the catalysts to speed up biochemical reactions, usually consist of three components, namely, some "trace" element, a protein-like part and a vitamin-like unit. That chain of elements and compounds links the soils with the dynamics of creation and maintenance of life very directly. As tools, the magnitude of



The variable numbers of crickets surviving (initially 25 eggs) and the different sexual maturities at the end of 56 days when fed on only cornmeal, illustrate the variable nutritional values when the corn was grown on soil fertilized with (a) no nitrogen (top photo); (b) 120 lbs. nitrogen per acre (center photo); and 250 lbs. nitrogen per acre (lower photo). By courtesy of Philip Stone, Department of Entomology, University of Missouri.

the mass of the enzymes is not an index of its magnitude of service, hence "trace" amounts become very important in very small amounts. Significance attaches itself to "trace" elements when they are active in the synthesis of proteins, and when their shortages have been connected with shortages of the most commonly deficient amino acids, methionine, and tryptophane and with the nitrogen fixation process by legumes. In terms of the problem of protein production the trace elements in a larger number become as significant as is the neglected element magnesium in chlorophyll and its synthesis of the carbohydrates. When the major elements, which we recognize in terms of their amounts available in correlation with the magnitude of the products created, are so badly needed as fertilizers, then surely the "trace" elements as tools, which in trace amounts are controlling the magnitude of production, become even more significant in our soil treatments.

The limited supplies of fertilizer resources demand knowledge and thrift in their use for more proteins, not just food.

Fertilizers, to date, represent about thirty per cent of our agricultural production, that is, our **creation** and not **transformation,** of new values, and of food values at that. With the recognized inadequacy of potential fertilizer resources for them to assume the complete production of food, it behooves us to learn the chemodynamics of the production still resulting from the fertility resources from the soil's virgin supply. Fertilizers are still only a bit of nutritional supplement, but the finishing supplement, to what the crop plants rustle up for themselves from the soil. It behooves fertilizer producers then to fit their products into the farmer's need for plant nutrition. In connection with that service fertilizer producers, distributors, and salesmen must therefore be better students of soil science in order to appreciate the importance of

(a) the climatic setting according as the degree of soil development in it represents soil under construction or under destruction;

(b) the clay content and clay nature of the soil representing high or low exchange capacities for extensive or limited stocks of fertility or disturbing amounts of hydrogen ions;

(c) the supply of fertility reserves in the silt fractions, virgin to the soil, and washed in or blown in on it, but yet to be broken down by the root activities resulting from carbonic acid output and serving as a sustaining fertility over a long time;

(d) the ratios of the activities of the nutrient cations and anions offered by the soil colloidal organo-inorganic complex representing suitable amounts and ratios exchangeable for the root's cation, i.e. hydrogen, and its anion, i.e. bicarbonate.

(e) those rations of the nutrient ions controlling the plant's synthesis largely of carbohydrate bulk only, or its synthesis also of proteins complete in all the amino acids required for the nutrition of plants, animals, and man; and

(f) the organic compounds in the soil to supply not only those required for plant nutrition of highest order, but all compounds contributing secondarily, via microbes as well as plants, to make the soil provide nutrition for us as body growth, body protection against degenerative diseases, and body reproduction in healthy offspring.

Fertilizers must move into the high service of real nutrition via the soil. The producers, distributors, and salesmen of them have a large opportunity—but a larger responsibility also—to give that service. The provision of it is a great challenge. We are confident that it will be accepted readily by the men in the fertilizer industry.

AQUAFIL! *Offers You...*

✓ BIGGEST SUPPLY ✓ BEST QUALITY
✓ LOWEST PRICE . . .

CONDITIONING AGENT FOR COMMERCIAL FERTILIZER—Aquafil is the product stabilizer that ends caking in the bag.

DILUENT FOR INSECTICIDES—With Aquafil you get high concentration which means savings.

COVERING AGENT FOR AMMONIUM NITRATE—High absorption qualities make Aquafil an effective agent.

RESIDUAL FILTERING AGENT IN PAPER INDUSTRY—Impurities rapidly filtered out by Aquafil's action.

INERT FILLER FOR INSULATION INDUSTRY—Aquafil offers stable, uniform filler for industry needs.

AQUAFIL PROPERTIES

Density: 9.6 pounds per cubic foot.

Fineness: 95.8% through 325 mesh.

Composition: Aquafil is amorphous diatomaceous silica.

Inertness: Used by many industries as inert filler.

Suspension: Excellent in water and air.

• More and more users of diatomaceous earth are turning to Aquafil . . . and finding it profitable. Aquafil offers you a high quality product, from North America's largest level deposit . . . and at less cost. It will pay you, too, when you look into the use of Aquafil as a means of improving your product, as it increases your profit margin. Next time you order diatomaceous earth . . .

Specify AQUAFIL!

AQUAFIL COMPANY **96 B Avenue N.E.** **Cedar Rapids, Iowa**

ARIZONA

Liquinox Company, Orange, California, are completing a plant in West Kingman to process yucca schidigera as a carrying medium for liquid fertilizer. Early Indians used the plant for medicinal purposes, and little boys use it to make spears —but this is said to be the first commercial application recorded, and is patented. **Gordon X. Richmond** and **Henry C. Garner** head the concern. **Robert Zumwalt** will be in charge of the new plant.

CALIFORNIA

Shell Chemical December 11 started anhydrous ammonia flowing from its new $10,000,000 plant at Ventura, set in the midst of flourishing grove lands. Opening the plant formally, President **R. C. McCurdy** said it typifies the important contribution made by the chemical industry to the great expansion in America's economy and that the new plant will be an aid to feeding the nation's expanding population.

The new plant has a capacity of 150 daily tons. It is located on a 27-acre site, handy to Shell's Ventura oil field, which offers an ample supply of natural gas. **Frank D. Kuenzly,** formerly superintendent of Shell's plant at Pittsburgh, is manager, with some 140 people employed.

* * *

American Potash & Chemical Corp., Los Angeles, while it does not sell direct to farmers, is mailing an extensive program of advertising direct to farmers, promoting complete fertilizer. The theme is that crops become less profitable when the soil is starved, hence fertilizer pays. Folders are aimed at specific crops. Examples may be obtained by writing them at 3030 West Sixth St., Los Angeles 54.

* * *

Wilson & Geo. Meyer & Co. San Francisco have their new **Western Phosphates** plant 95% ready, according to word the middle of last month. It will turn out 92,000 annual tons of triple superphosphate, ammonium phosphate and liquid phosphate.

FLORIDA

Davison Chemical will start production of sulfuric acid at Bartow, early this month as the first step in placing in operation the company's new $12,000,000 triple superphosphate plant at that site. Output of acid will precede main process operation by about two weeks, the announcement said.

Rated capacity of the acid unit, 550 daily tons of 100 per cent sulfuric acid, will make it the world's largest unit producing this chemical, according to records of **Monsanto Chemical Co.,** designers of the plant. The contact process is employed. Heat developed in the reaction is used to produce steam which powers many pieces of equipment in the triple superphosphate and acid plants.

Equipment of the acid unit includes molten sulfur filters; storage facilities for 8400 tons of sulfur and 6000 tons, in three tanks, of acid as 66 degrees Baume acid; a converter 39 feet high by 24 feet diameter and absorbing and drying towers 34 feet high by 24 feet diameter. The latter are of steel, brick-lined and packed.

Capacity of the triple superphosphate plant is rated at 200,000 tons annually, which is estimated to make Davison the second largest producer of this chemical. Initially, the entire output of the acid unit will be required in the main process. Later, there may be a surplus of acid for sale.

* * *

Armour Fertilizer has gotten underway the phosphate project announced a year ago by President **John E. Sanford,** and for which a $7,000,000 certificate of necessity was issued—as we reported here at the time—but delayed for various reasons. This plant will mark the reentry of Armour into the phosphate mining field, after an interval of 30 years.

The new plant is to be built alongside their present fertilizer plant at Bartow, and will be a five-story washer and flotation plant east of the present structure. The remainder of the plant will be west of the fertilizer plant.

The designs were prepared by **Attapulgus Minerals & Chemicals Corp.;** washer and flotation units and storage and grinding facilities are being built by **Frank M. Murphy & Associates. E. C. Johnson,** Armour's Bartow general manager will have general supervision of the operation. **Harold Hedrick,** from Armour's Atlanta headquarters, is project engineer.

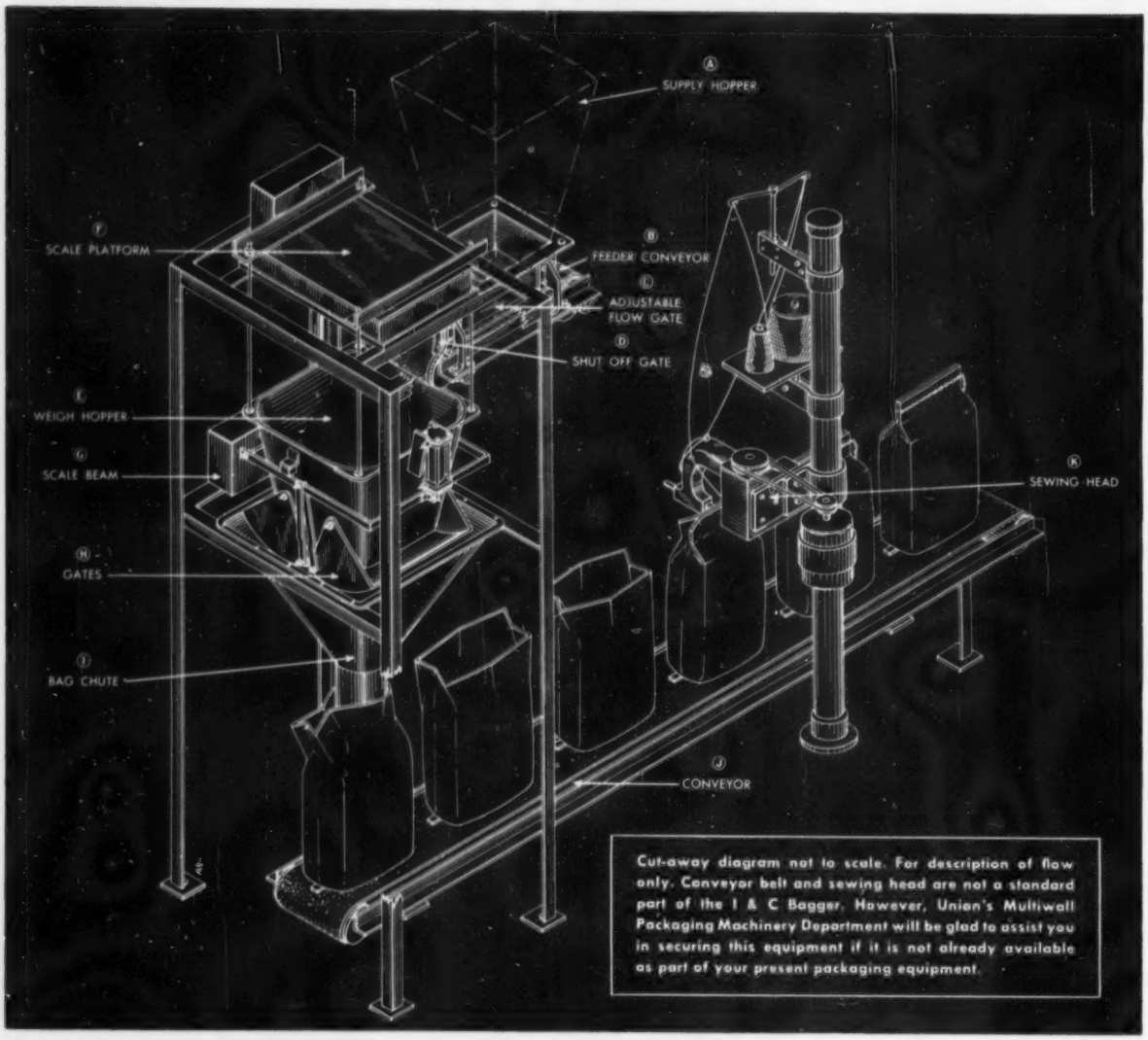
* * *

Gulf Fertilizer, Tampa, recently held a contest to find the person who had used its goods for the longest number of consecutive years. First prize was $500.

GEORGIA

C. O. Smith, Moultrie, have begun construction of their plant at Douglas, reported here in October. It will occupy a 3.7-acre tract, be of frame construction with 65,000 square feet of floor space. **C. O. Smith, Sr.** says it will be operated independently of the Moultrie plant, with **Curtis Plymale** moving from Moultrie to be resident manager.

NOW! UNION BAG OFFERS


A SUPPLY HOPPER
F SCALE PLATFORM
B FEEDER CONVEYOR
C ADJUSTABLE FLOW GATE
D SHUT OFF GATE
E WEIGH HOPPER
G SCALE BEAM
K SEWING HEAD
H GATES
I BAG CHUTE
J CONVEYOR
Cut-away diagram not to scale. For description of flow only. Conveyor belt and sewing head are not a standard part of the I & C Bagger. However, Union's Multiwall Packaging Machinery Department will be glad to assist you in securing this equipment if it is not already available as part of your present packaging equipment.

OPERATION IS SIMPLE AND PRACTICALLY FOOL-PROOF

MATERIAL to be packaged flows from supply hopper (A) to feeder conveyor (B) which carries material to weigh hopper (E). Adjustable flow gate [located at (C) but not shown] regulates amount of material which feeder conveyor carries. This controls speed of filling cycle.

Weigh hopper (E) is suspended from scale platform (F). When material fed into weigh hopper reaches weight set on scale, the scale platform actuates scale beam located in box (G).

Scale beam sets off a system of synchronized switches which stop the feeder conveyor (B), lower a shut off gate [located at (D) but not shown] on the weigh hopper end of the feeder conveyor. This prevents any excess material from dribbling into weigh hopper, insuring accurate weight. Switch also opens gates (H) at bottom of weigh hopper. Pre-weighed material drops through filling spout (I) into bag.

With weight removed from scale, scale beam (G) now actuates synchronized switches in reverse order. Simultaneously gates (H) to weigh hopper (E) close . . . shut off gate (D) raises . . . and feeder conveyor (B) starts up and begins next filling cycle.

Bag is held on filling spout (I) by hand. As material drops quickly through spout into bag, filled bag drops onto a moving conveyor belt (J). This belt carries bag through sewing head (K) to complete packaging cycle.

I&C Bagger

Automatic Weighing and Filling Machine for Open Mouth Bags

FASTEST AUTOMATIC BAGGER

MUCH-DISCUSSED I & C BAGGER WEIGHS AND PACKS FREE-FLOWING, NON-BRIDGING MATERIALS AT SPEEDS UP TO 20 100-LB. MULTIWALLS A MINUTE!

DOLLAR FOR DOLLAR, the new Inglett & Corley Bagger, sold exclusively by Union Bag, is the most efficient and practical unit for accurate, high speed weighing and packing of free-flowing, non-bridging materials.

The I & C Bagger processes 400 to 500 tons in an eight hour day. Its filling and weighing cycle is completely automatic. Weight tolerance is close: in continuous runs, the machine can and does pack to within 4 ounces per 100 lb. bag.

LOWEST COST AUTOMATIC OPEN MOUTH BAGGER

Total cost of the I & C Bagger, with conveyor and sewing head, is more than 25 per cent below any comparable unit, and the I & C has a packing rate 25 per cent greater than any other open mouth packer.

WORKS WELL WITH ALL SIZES OF OPEN MOUTH BAGS

Changeover from one weight to another takes only the few minutes needed to change the scale beam balance. The I & C Bagger handles any open mouth bag, paper or textile, from 10 through 200 lb. weights.

NEEDS ONLY TWO OPERATORS

The I & C Bagger pre-weighs and packs with only one operator plus another man on the sewing equipment. Unskilled labor can be used; men require a minimum of training and supervision.

INSTALLED AND OPERATING IN TWO DAYS OR LESS!

Only 5′ x 5′ floor space, 8′ headroom over conveyor needed. Factory trained personnel will make installation, if desired, at actual cost.

DELIVERY PRIORITIES BASED ON RECEIPT OF ORDER

For quickest possible delivery, consult a Union Packaging Specialist now. Union can also advise you on plant layout and on whatever supplementary packaging machinery you may require.

HIGHER PRODUCTION . . . LOWER COSTS . . . LESS DOWN TIME . . .

Ask to see the impressive performance records the new I & C Bagger already has established in daily field use. Production jumps. Labor costs drop sharply. Down time is slashed.

Make your own comparison with any other packer. Verify for yourself that Union's I & C Bagger is more economical initially—cheaper to install—less expensive to maintain.

Manufactured by
INGLETT & CORLEY, INC., AUGUSTA, GA.
Exclusive sales agents:

Union Bag & Paper Corporation
Woolworth Building, New York 7, N. Y.

MULTIWALL PACKAGING MACHINERY DEPARTMENT

The plant will employ some 75, and is expected to be in full operation by the late fall of this year. C. O. Smith Guano Company has been in the fertilizer business for more than 33 years. Sons **C. O., Jr.** and **Jack** are associated with their father in the business.

* * *

Louisville Fertilizer and Gin Co., Louisville, lost by fire, a warehouse which contained cottonseed. No damage was done to the fertilizer side of the business. Manager **R. N. Whigham** says the loss was covered by insurance.

* * *

Mutual Fertilizer Company, Savannah, held a two-day sales meeting last month, with President **Charles Ellis, Jr.** presiding. At the end of the meeting the staff was entertained at a steak fry at the Ellis home, and a fishing trip.

ILLINOIS

Illinois Farm Supply Co. has bought a tract at Tuscola, adjacent to the **National Petro** plant there, and General Manager **C. H. Becker** told a recent stockholders meeting that the new plant may be in production by December of this year. The plant is to produce high analysis goods using sulphuric and nitrogen from **U.S. Industrial** and **Petro.** The sale of debenture bonds is planned to supply $3,000,000.

KENTUCKY

Federal Chemical Co., Louisville, will double its **Butler,** fertilizer plant, according to **John V. Collis,** president. This is one of six commercial fertilizer plants operated by Federal throughout the South and Mid-West. Butler is being doubled in size and completely modernized with the latest in mixing and shipping equipment. Conveyor belts will move all materials from the time they enter the plant until the completed product moves onto the customer's truck. Semi-automatic mixing equipment will be installed and automatic valve packers will handle the packaging. The Sales Service office is located at the plant site in Butler under the direction of **Floyd L. Lucas.**

NACO'S PUSH BUTTON PLANT IS GEARED TO TAILORED GRADES

In Florida a problem exists which is far from common to the industry. There it is not unusual for a plant to turn out several hundred different analyses in a single season. So the construction of the new Naco plant at Fort Pierce is of special interest. This has been a hard-luck plant. No sooner was it completely rebuilt as a "push-button" operation in 1951—and almost before a wheel turned there—it was destroyed by fire.

Naco Fertilizer Company's new Fort Pierce, Florida plant, under construction since last year, is now in operation. The plant, with an annual capacity of 50,000 tons, replaces the one destroyed by fire in November, 1951.

According to the A. J. Sackett and Sons Co. of Baltimore, Maryland, the Fort Pierce plant is, to their knowledge, the first of its kind ever to be "custom-engineered" throughout to meet the complex manufacturing problems due to Florida's required multiplicity of grades. The Sackett organization designed, constructed and equipped the new, highly-mechanized plant.

The plant has superior facilities for "prescription" orders, of vital importance in a state where it is not uncommon for a fertilizer company to mix several hundred different formulations in a year's time. Three large multiple hoppers supply twenty-four different materials to large Toledo dial scales at the touch of a lever, and then to a four-ton gravity mixer, via conveyors and elevators. Richardson Automatic Pre-Weight baggers fill the bags for sewing.

Basing is entirely separate from the shipping operations. Another multiple hopper, a two-ton rotary mixer, and a system handling nitrogen in liquid forms lay down an ammoniated superphosphate base for curing.

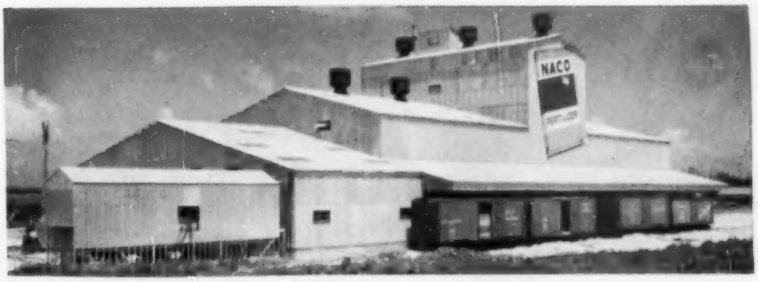
Throughout the plant, materials are handled by Payloaders, conveyors and elevators. Reversible shuttle conveyors deliver materials to any bin in the house. Containing 32,240 square feet of floor space, the Naco plant towers 82 feet into the air, and measures 248 x 130 feet. Twenty-eight bins supply storage for 7,000 bulk tons. Within the main building there is space for 1,000 bagged tons. The shipping dock contains space for 500 bagged tons. The plant is so designed that extensions could be put on each end of the building to accommodate more bins for raw materials; and with this addition to storage facilities, the equipment is capable of producing 75,000 tons annually. This plant is equipped for all-weather unloading as well as shipping. This is very important in an area where the normal annual rainfall is 55 inches.

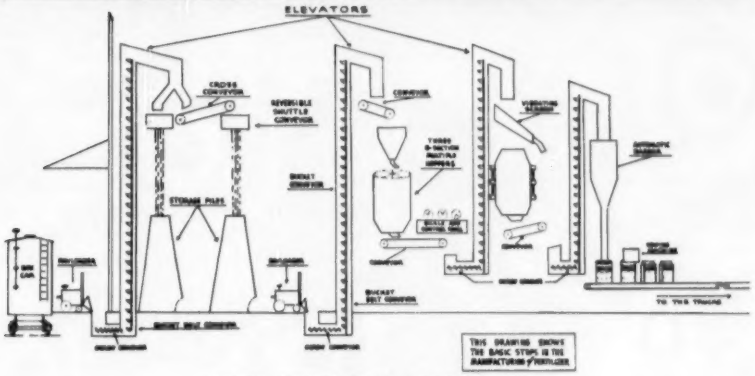
A recorder tape gives a permanent record of each material going into a mixture, and its weight. This gives the plant superintendent an excellent check for precaution against errors.

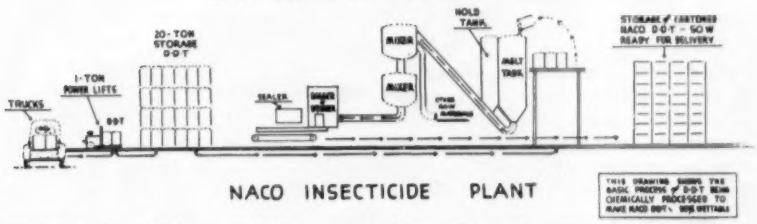
The Fort Pierce plant is considered one of the most modern in North America.

O. C. Minton will supervise Naco's Florida operation, with plants in Jacksonville and Fort Pierce. Centralized control, however, will be maintained from the combined general offices of Naco Fertilizer Company and Thurston Chemical Company, which are located in Joplin, Missouri.

Both Naco Fertilizer Company and Thurston Chemical Company of Joplin, are wholly owned subsidiaries of W. R. Grace & Co., international industrial and trading concern, which has started a large scale expansion in the chemical field. Operations of both companies will be under the direction of William R. Thurston of Joplin. Thurston is president and a director of both Naco Fertilizer Company and Thurston Chemical Company. Naco operates







plants in Fort Pierce and Jacksonville, Florida; Charleston and Spartanburg, South Carolina; Wilmington, North Carolina; and Findlay, Ohio. The Thurston Company has plants in Joplin, Missouri; Tulsa, Oklahoma; Lawrence, Kansas; and Trenton, Misscuri.

Bluegrass Plant Foods, Inc., last month opened their new $250,000 Danville plant which will turn out 35,000 annual tons. It is headed by **Osmer S. Deming,** with **Gene Van Deren** as vice-president, **A. M. Van Deren** as secretary. **Zach P. Smith** is plant manager.

LOUISIANA

Freeport Sulphur are in production with their Garden Island Bay operation, which they tell us is the largest single sulphur mining development in twenty years. The operation cost $14,000,000 to get under way, mining from a salt dome 1850 feet below the surface of the marsh area. As we have previously reported, the sulphur is mined with superheated water, then carried in insulated barges to storage fifty miles upriver at Port Sulphur. At peak the operation is expected to yield 500,000 annual long tons.

* * *

Davison Chemicals's Gretna Division has been presented a certificate of commendation by the New Orleans Safety Council for 211,989 man-hours without a disabling injury. **E. M. Harold,** division manager, received the certificate from the Council along with **A. J. Brewer,** plant superintendent.

Green and Reedy Fertilizer, Franklinton, will have the benefit of water rates, when the Pearl River navigation project is completed, according to **Chester Green,** co-owner. They ship an annual 30,000 tons and would be one of the largest sources of tonnage for the facility.

MARYLAND

W. B. Tilghman Co., Salisbury, suffered a $100,000 fire in their Pocomoke City plant. They had been operating at capacity, bagging fertilizer for the Spring season, and 2000 tons of fertilizer, stored in the warehouse, were destroyed, as well as the plant itself.

MICHIGAN

General Chemical is to increase its River Rouge sulphuric acid capacity, with an eye on increasing demand from that area, including fertilizer needs. The new unit, following hard on the one just put into production, is slated for operation this Summer.

MISSISSIPPI

Mississippi Chemical stockholders have approved the plan to expand their Yazoo City plant by a 400 daily ton unit. They made a donation to **Mississippi State College** of $50,000 to establish a perpetual foundation of agricultural research.

MISSOURI

Thurston Chemical are planning a million dollar sulphuric contact plant as an addition to the Joplin operation. The plant is to turn out ammonium sulfate, phosphoric acid, triple and superphosphate. No starting date has been announced.

* * *

Missouri Farmers Association plant, building at Joplin, is now going into the steel erection stage, and major equipment is arriving. As reported here when the plant was announced, it is a $3,500,000 project, designed by **Dorr.**

NEBRASKA

Schrock Brothers Fertilizer Service, Congerville, Ill., has installed anhydrous storage at Wymore, and plans installations at 11 other points,

including Burchard, Liberty, Verdon, Blue Springs and Sterling in Nebraska. The remainder will be in Kansas.

NORTH CAROLINA

Fremont Oil Mill Company, Fremont, was recently the subject of a newspaper story which showed it as having been founded in 1902, sold to **Davison Chemical** in 1929, sold by them in 1940 to the **Lane** family who now operate it. Of the Lanes, **J. B.** is president and **E. R.** vice-president. **Mrs. P. L. Hayes** is secretary-treasurer. **W. R. Jones** is superintendent of the plant which employs 80 people in season, and occupies 100,000 square feet of floor space.

OKLAHOMA

Nichols Seed and Feed Co., had a $15,000 fire in their fertilizer plant at Jones. The fire was confined to one of their four plant buildings. Plant manager is **Jake Gillespie.**

THE DEL-MAR REGION'S NEWEST FERTILIZER PLANT

Warner Price, Inc., of Smyrna, Delaware, when increased demand for fertilizer taxed their plant and water transportation for raw materials no longer became practical, made plans for rebuilding at a new site with rail facilities.

The new installation located just outside the city limits has recently been completed and is now shipping complete fertilizer.

The plant proper consists of a building 64 ft. wide by 180 ft. long with a gallery extending down the center approximately 20 ft. above the floor. A one story extension along one side provides space for storage of bagged material as well as an office and separate motor control room.

The building with walls of precast concrete slabs and roof of standard built-up design is built around a structural steel frame. All bins are provided with bookshelf bulk heads, with the back section being erected approximately 9 ft. away from the wall. This construction keeps all lateral pressure from the walls so that they act solely as a building enclosure. The operating aisle extends down the center of the plant.

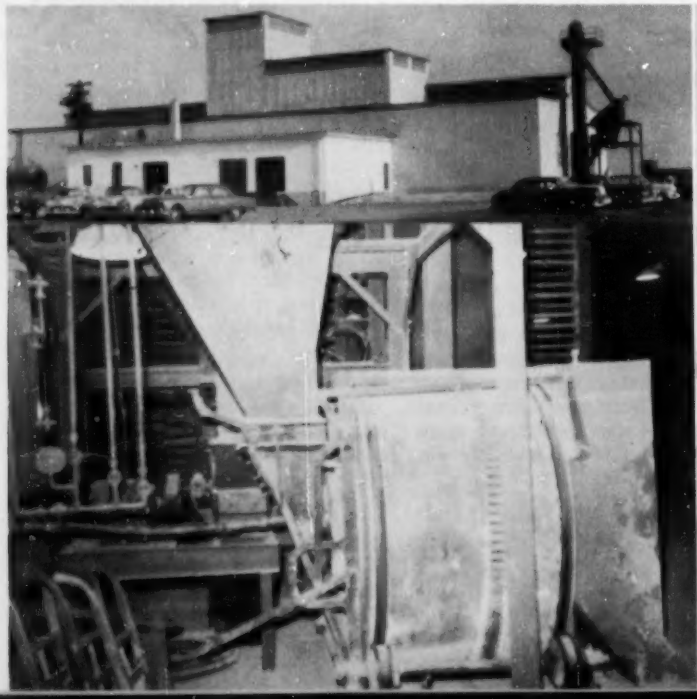
Bulk raw materials arriving either by rail or motor truck are unloaded at one end of the plant. Here a bucket elevator placed entirely outside the end wall elevates material to a fixed belt conveyor. This in turn feeds a reversible shuttle belt, thence to a portable belt which delivers to the various raw material bins.

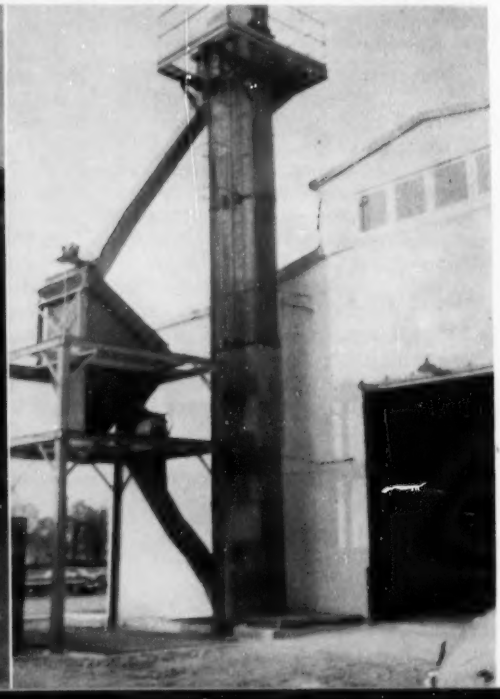
The main machinery is located along one side and approximately in the center of the plant. This consists of a five compartment hopper system with one weigh scale under it. The weighed batch discharges by gravity to the first elevator of a one ton mixing unit. Here proper blending and ammoniation is carried out using any of the standard nitrogen solutions. The mixed fertilizer is elevated by a second bucket elevator and carried to the proper bin by a system of belt conveyors which are entirely separate from the raw material storage belt conveyors.

Adjacent to the mixing unit, there is a separate bagging system. This consists of an elevator, screen, and tailings mill with all bagging being done through a St. Regis packer.

As this territory has developed a large tonnage of bulk spread material, a complete separate bulk loading unit with a truck scale under the hopper has been provided on the outside of the building. With the installation of this separate unit, bulk shipping can be carried out entirely independent of bag shipments.

The building was designed and erected by Lewis Bowers & Son Co., Princeton, N. J. with the entire machinery system being designed and furnished by Stedman Foundry & Machine Co., Inc., Aurora, Indiana.





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Wood pulp from Albemarle's own trees goes into the maw of this Giant that turns out eleven freight car loads of Kraft paper daily. Albemarle's own color matching and printing, its own pasting and sewing facilities carry on the completely integrated and rigidly controlled operations that make Albemarle Multiwalls famous for sturdiness and good looks.

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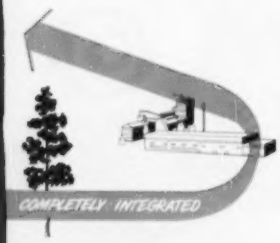

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TEXAS

Chillicothe Chemical Manufacturing Company will build near Wichita Falls a $17,000,000 anhydrous ammonia plant, according to **Henry Brandon** of Dallas, who is vice-president of the Greater McMurry College Foundation of Abilene. Construction is slated to begin this year, and to be completed in 1955. The plant, to be located on a 100 acre tract is expected to produce thirty daily tank cars of anhydrous ammonia. Mr. Brandon says the location was chosen for the almost inexhaustible water supply there.

* * *

Standard Sulphur has started production at their Damon Mound wells, said to be the first new company to produce sulphur in Texas since 1935. **Gibert E. Ebarb, Sr.,** is president of the concern which began construction of the $450,000 mobile plant in April.

* * *

Campbell Fertilizer Co., Houston have registered **"Green-Glo"** as a trade-mark for their fertilizers.

UTAH

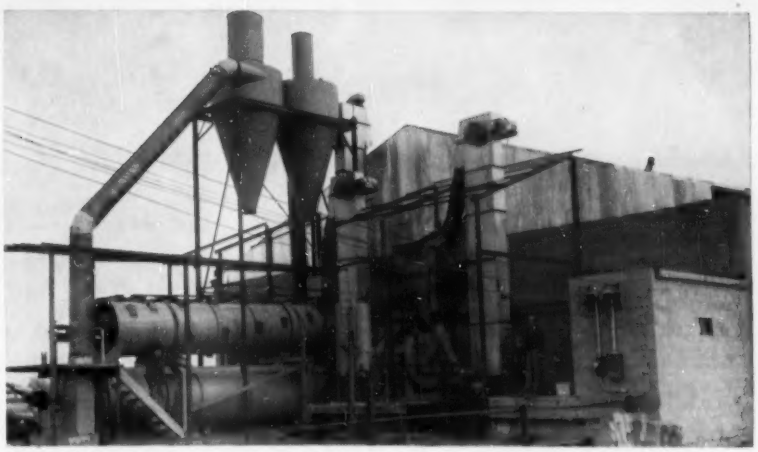
Monsanto are reported considering the erection of a multi-million dollar plant near the Clear Creek natural gas fields. Vice-president **J. L. Christian** says they are working with **Utah Chemical,** who are now building at that location, to determine the feasability of the project, and have sent 12 research men to the site.

VIRGINIA

Virginia-Carolina had a flash fire in their burlap bag division at Richmond, which was quenched before there was any damage except to 30 rolls of burlap and some stock stored in the basement.

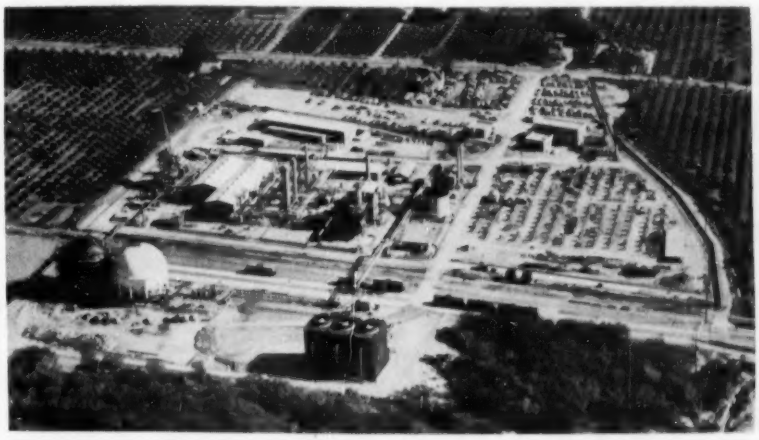
WYOMING

Continental Sulphur and Phosphate Corp. has contracted for construction of a 50-ton sulphur plant at Thermopolis, which should be ready by mid-Summer. They are licensed by **American Sulphur & Refining** to use the solvent extraction process.



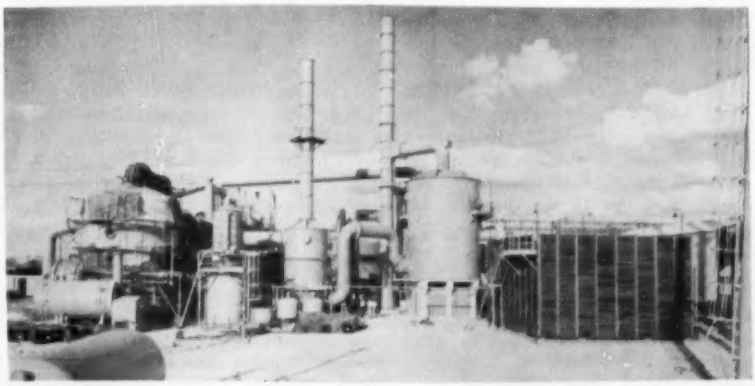
Plant of Crystal Chemical Co., three miles south of South Sioux City, Nebraska. Ground was broken September 15 and operations started Dec. 22. Building is of clay tile construction with main plant 80 ft. by 120 ft. and shipping warehouse 80 ft. by 40 ft. added to one end. The Crystal Plant is of latest design and will produce a 100% granular product to shop in bags or bulk. The plant was engineered by W. P. Glaspey, Blue Valley Engineering Co. of Marysville, Kansas, and a large share of the machinery was manufactured by Blue Valley, including the Granulating unit. Officers of the company are Fred Sherer, a stockman of Coleridge, Nebraska, President, and Fay Stewart, Vice President, a retail feed dealer of Laurel, Nebraska. Tom Meylor will be Superintendent.

The firm also plans to build on the same property a tourist motel, a super gasoline service station to serve livestock trucks hauling to Sioux City, and a Cafe.



This new multi-million dollar plant, set in flourishing grove lands near Ventura, California, was opened Dec. 11 by Shell Chemical Corporation to produce ammonia. The two huge storage spheres in the left foreground, 55 feet in diameter, can each hold 2800 tons of ammonia.

View of sulfuric acid production unit at The Davison Chemical Corporation's triple superphosphate plant which is now being completed near Bartow, Fla. Acid unit is said by its designers, Monsanto Chemical Co., to be largest in world—daily rated capacity 550 tons of 100% sulfuric acid. Structure above with scaffolding still in place is the convertor, with boiler and other water equipment in front and at side. Item with shorter stack is SO_3 cooler; one with longer stack is the absorbing tower where SO_3 is absorbed in H_2SO_4. Box-like structure at right is acid cooler.



CANADA

Potash Company of America will spend $220,000 on 100,000 acres near Saskatoon, Saskatchewan—for which they have a prospecting permit—choosing a 10,000 acre area on which to apply for a lease. Their prospecting permit runs for three years.

• • •

Consolidated Mining and Smelting have brought their $9,000,000 ammonium phosphate plant into production at Kimberley, British Columbia, with 190 daily tons production.

• • •

Ontario Plant Foods, Delhi, Ontario, who only a year ago celebrated the official opening of their plant, have already celebrated the opening of an addition, which almost doubles their floor space, and is used for storage. The original building was 140 by 80 feet. The new wing is 112 by 78 feet, and required additional conveyors as well as storage bins which were installed by **Tillsonburg Machine Shop.**

• • •

Interprovincial Cooperatives, Winnipeg, has bought a chemical plant at St. Boniface, Manitoba, and will produce pesticides for co-op members.

HAWAII

Pacific Chemical & Fertilizer has put into operation its plant at Alemeda for processing ammonia and storage tanks in Honolulu, Nawiliwili and Kahului. **Matson Navigation** have adapted two freighters to handle the aqua ammonia, which comes from **Shell, Hercules** and **Dow.**

INDIA

Pakiston Industrial Development Finance Corporation has taken on the construction of the first fertilizer plant at Daud Khel in the Punjab, which will take three years to build and will cost Rs 5,500,000. It is planned for a capacity of 50,000 annual tons of ammonium sulphate, and has largely been financed by the US Technical Cooperation Administration.

• • •

Sindri Fertilizer has issued a world-wide invitation for bids on the erection of a urea and ammonium nitrate plant to turn out daily 35-60 tons or urea, 100-150 tons of ammonium nitrate, and to cost Rs 150.

MEXICO

Mexican Sulphur Co., American owned, put into operation last month its $6,000,000 sulphur plant, the first large-scale operation of its kind in Mexico. The company is a subsidiary of **Mexican Gulf Sulphur,** and expects to turn out 200,000 annual tons from reserves that are estimated at 11,000,000 tons.

• • •

Texas International Sulphur Co., Houston, announced through its president, **Victor Dykes,** that it plans to build a plant for extraction of crude sulphur at San Felipe, Baja California, to process sulphur from its Navarro concessions. **J. Harry Pollard,** Houston consulting engineer is designing the plant and will supervise construction.

SANTO DOMINGO

South Porto Rico Sugar Company has bought engineering and operating "know-how" from **The Quaker Oats Company,** and will build a furfural plant at La Romana, Dominican Republic.

VENEZUELA

The Venezuelan Development Corporation has virtually completed its studies and is about ready to recommend the erection of a Bs. 20,000,000 fertilizer plant. No fertilizer is now being made in Venezuela and it is believed that local production from local materials would lower prices, and thus increase consumption, which is now only 14,000 metric tons.

GRANGE AND APFC JOIN IN SPONSORSHIP OF ESSAY CONTEST

The National Grange and the American Plant Food Council have jointly announced a new Conservation Essay Contest built around the theme "Building Fertility To Cut Farm Costs."

State and National prizes totaling $5000 will go to the young man or woman under 21 years of age who submits a winning essay prior to the closing date of March 31, 1954.

Subordinate Grange Lecturers in 7,200 local Granges are arranging community contests all across the country, often offering additional prizes. The closing date for submitting an essay is March 31, 1954.

Both Grange and non-Grange youth are urged to enter the contest and study such topics as building soil fertility, sound land use policies, and efficient farm production methods as a means of cutting farm costs.

Essays are not to exceed 800 words, and must be submitted before March 31, 1954 to the nearest Subordinate Grange in the 37 Grange States. In the other eleven states, essays may be given to County Agricultural Agents, Vo-Ag teachers, or Soil Conservation Service technicians, who are already encouraging farm youth to participate in all states.

All three of these groups, plus Subordinate Grange Lectures, have full details.

Many schools are joining with local Granges in sponsoring the Contest as a part of their basic training in English and Conservation.

Certificates of award will go to all State and National winners. The first six National winners will be given expense-free trips to the 1954 Convention of the National Grange in the Pacific Northwest.

In addition to the local cash awards, each local first-place winner will receive a beautiful embossed pin and a certificate, provided five or more contestants enter his local contest.

Judges include nationally prominent conservation and educational leaders, with Ezra Taft Benson, of the Dapartment of Agriculture, heading the list.

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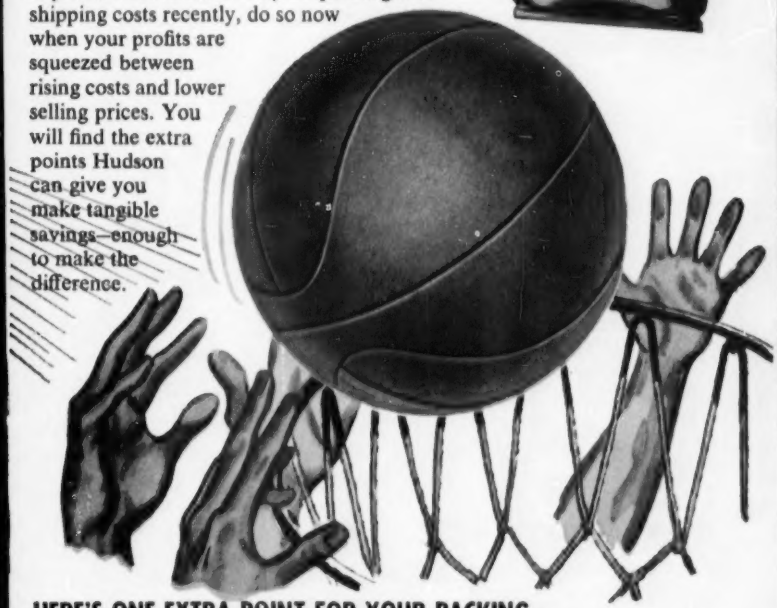
Only one shot out of the more than 100 per game is the decisive margin in many contests between evenly matched teams. But it is enough to make the difference.

With multiwall sacks, too, strong contenders are matched to excel in supplying your needs. There are differences between their services and their sacks which, taken individually, may seem small. But over the whole season, these extra points are enough to make the difference.

If you haven't checked on your packing and shipping costs recently, do so now when your profits are squeezed between rising costs and lower selling prices. You will find the extra points Hudson can give you make tangible savings—enough to make the difference.



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The farmer who buys fertilizer wants good results from every sack of fertilizer he buys – that's what builds his profits. Manufacturers, such as yourself, are equally anxious for consistent and uniform results because that's how you build a repeat business – and that's what builds *your* profits. Uniformity is an important factor to you and to the farmer. It's ***enough to make the difference!***

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Check over this list of 100% services that Hudson Multiwall Sacks offer you.

Mail the coupon on the other side of this page for complete information.

Some echoes

FROM THE JOINT ASA AND SSA MEETING

It was a very big meeting, and a great many important papers were read. We have tried here to give a cross-section of these, without undue reference to their importance, either in selection or in sequence of our presentation.

Farmers are testing more of their soil and are making substantial savings as a result. Chemical tests, explained Prof. W. L. Garman, determine not only the immediate supply of nutrients available for crop growth, but also the continued supplying power of different soils. The tests are being used to map out areas which have high, medium, and low potentials for furnishing nutrients to plants.

Soil today must supply nutrients at a fast rate to produce high potential yields which are possible with new corn hybrids and improved varieties of other crops, Professor Garman emphasized.

* * *

Soil tests don't give all the answers when it comes to planning a fertilizer program.

That warning came from Emil Truog, K. C. Berger, L. E. Engelbert, and A. F. Peterson, University of Wisconsin, who related how they have been able to "prescribe" fertilizer treatment for corn fields on the basis of soil tests . . . plus some adjustments found out from field experiments.

The researchers pointed out that soils tests reveal amounts of different plant food elements in a soil. But the tests do not tell how much of the elements a crop can "digest."

In 1952, they wrote fertilizer prescriptions for 173 Wisconsin corn fields. Those fields averaged 125 bushels per acre.

But, they hastened to add, it isn't merely a matter of learning how much of the food elements are in the soil, then adding the remainder a crop needs in the form of fertilizer or manure. Their experiences and tests have shown that a corn crop can take up only 30 to 60 per cent of the nutrient elements in a material.

* * *

Comparisons of drought resistance of different grasses by what might well be called remote control observations (by use of the Geiger counter and radioactive fertilizer) were reported by plant breeders and soil scientists of the U. S. Department of Agriculture and the Georgia Coastal Plain Experiment Station at Tifton. Great differences in the speed and ultimate depth of root penetration were noted in these studies.

By making year-old plantings of 4-inch cubes of sod of several sorts of southern grasses over placements of radioactive phosphate fertilizer at different depths in a sandy soil 8 feet deep to the clay subsoil, the scientists were able handily to keep track of what the individual root systems were doing. This watching was done simply by turning the Geiger counter on the above-ground parts of the plants and noting when the sap became radioactive. Thus they learned at once how deep the roots had gone and how long it took them to get there.

* * *

Soil Microorganism selectively absorb ammonium nitrogen and reject nitrate nitrogen when both forms are available together for their use, according to Sven L. Johnson, M. J. Hallan, and W. V. Bartholomew, of Iowa State College.

By the use of tracer techniques, using heavy nitrogen, N^{15}, they found that when ammonium nitrate was supplied to microorganisms decomposing oat straw that the ammonium was used and the nitrate was rejected as long as the ammonium supply was adequate. When ammonium was not added the organisms adjusted their appetites and used nitrate.

* * *

N. T. Coleman, agronomist at N. C. State College, reported that he and W. J. Jakobi, former graduate student at the institution, have found a method to determine the concentrations of cations, or positively charged plant nutrients, in soils.

As background, Coleman pointed out that the soil serves as a reservoir of many plant nutrients. The positively charged nutrients (cations) are attracted to and held in the soil by negatively charged particles of clay or organic matter. The result is that cations are concentrated in the region close to the surface of soil particles, and they are usually present in low concentrations in soil water.

How readily the absorbed cations move from the soil to plant roots can be found by measuring the rates at which soil-absorbed cations are transforred to a second cation absorbing material mixed with the soil, according to Coleman. The material used to stimulate removal of cations by plant roots was a synthetic resin similar to those used in water softening.

"By comparing rates at which soil-absorbed cations were transferred to the exchange resin with rates at which the resin picked up cations from solutions of different concentrations, it was possible to describe the cation-supplying power of a given soil system. . . ."

* * *

Radioactive tracing and chemical analyses by Michigan Agricultural

Experiment Station add proof that legume-grass hay makes good use of top-dressed or near-surface superphosphates.

Field tests at five sites over a three-year period show both spring and midsummer benefits, said Dr. Kirkpatrick Lawton, Michigan State College. His associates were Dr. Milo B. Tesar, farm crops researcher, and Dr. Bergene Kawin, agricultural chemist.

* * *

A technique that may make it possible to determine why plants vary in growth and composition, even when grown under apparently identical conditions was reported by Dr. D. A. Brown and J. C. Noggle, both of the Agricultural Experiment Station agronomy staff at Fayetteville, Ark.

Plants were grown without allowing the roots to come in contact with the soil, by arranging for the plant roots to grow between two cellophane sheets. This permitted the nutrients and moisture to pass from the soil into the roots, while keeping the actual soil from contact.

Through this method they were able to measure at various stages the uptake of plant nutrients on the root surface, into the roots, and into the top portions of the plant. In the four-week experiment with soybean plants, they used three different soil types, and fertilized to give three levels of potassium and five levels of magnesium.

They found that rate of potassium uptake was much higher than that of calcium. They also found that increasing magnesium fertilization did not adversely affect the uptake of calcium and potassium. As might be expected, increasing potassium and magnesium in the soil also increased these nutrients in all parts of the plant.

Probably the most important finding, Brown reported, was the fact that the type of clay in the soil caused a decided difference in the amount of nutrients taken up. With this knowledge, he said, it should be possible eventually to make more accurate fertilizer recommendations.

The fertility level of a whole county is pretty accurately indicated by a sampling of the farms that make up the area, according to R. E. McCollum and W. L. Nelson of the N. C. State College agronomy department. From a study made in Duplin County, N. C. McCollum sampled 1,184 fields there and compared the soil test results with testing results of samples sent in by farmers. The comparisons showed that differences in the soil summaries and farmer-samples were small.

"The studies leave no doubt as to the value of soil test summaries," according to Nelson.

* * *

A new soil test, developed at the University of Wisconsin, will reveal how much available nitrogen is in the soil. The new test, developed by Emil Truog, H. H. Hull, and M. M. Shihata, measures the amount of nitrogen that is in such form that it can easily be changed to ammonia. The test is based on a chemical reaction with alkaline permanganate, with a measurement of the amount of ammonia liberated by the reaction. Results can be read directly as pounds of available nitrogen per acre.

* * *

Applications of some forms of phosphate fertilizer accumulate at higher levels of available forms in the soil than others. And the amount of phosphorus left in the soil in forms available to the plants in any year is greater from some fertilizer compounds than others. Superphosphates and calcium metaphosphate left more available phosphorus in the soil than did rock phosphate and fused tricalcium phosphate, according to John Pesek and John R. Webb, Iowa State College. They measured the available phosphate in experimental plots where equivalent quantities of these different forms of phosphate fertilizer had been applied over periods of 5 and 32 years.

Ordinary superphosphate, concentrated superphosphate and calcium metaphosphate appeared to have equal effect upon the residual level of available soil phosphorus and upon the 1952 yields of oats at Ames. Fused tricalcium phosphate compared favorably with these on acid soil, but was less effective on a calcareous soil in western Iowa. Rock phosphate that had been applied at equal or higher rates was less effective at all locations.

* * *

Applications up to 100 pounds of nitrogen to the acre for potato lands in Malheur county, Oregon, have been recommended by Oregon State college researchers following 14 field studies of fertilizer effects on yields, quality, and specific gravity of potatoes.

John A. Yungen, soils department research assistant, Albert S. Hunter, USDA and OSC soils scientist, and Turner Bond, Malheur county extension agent, conducted the trials on 13 irrigated farms during the past four years in cooperation with Malheur county farmers.

Rates of nitrogen above 100 pounds did not increase total yields and frequently showed decreases in yields of No. 1 potatoes.

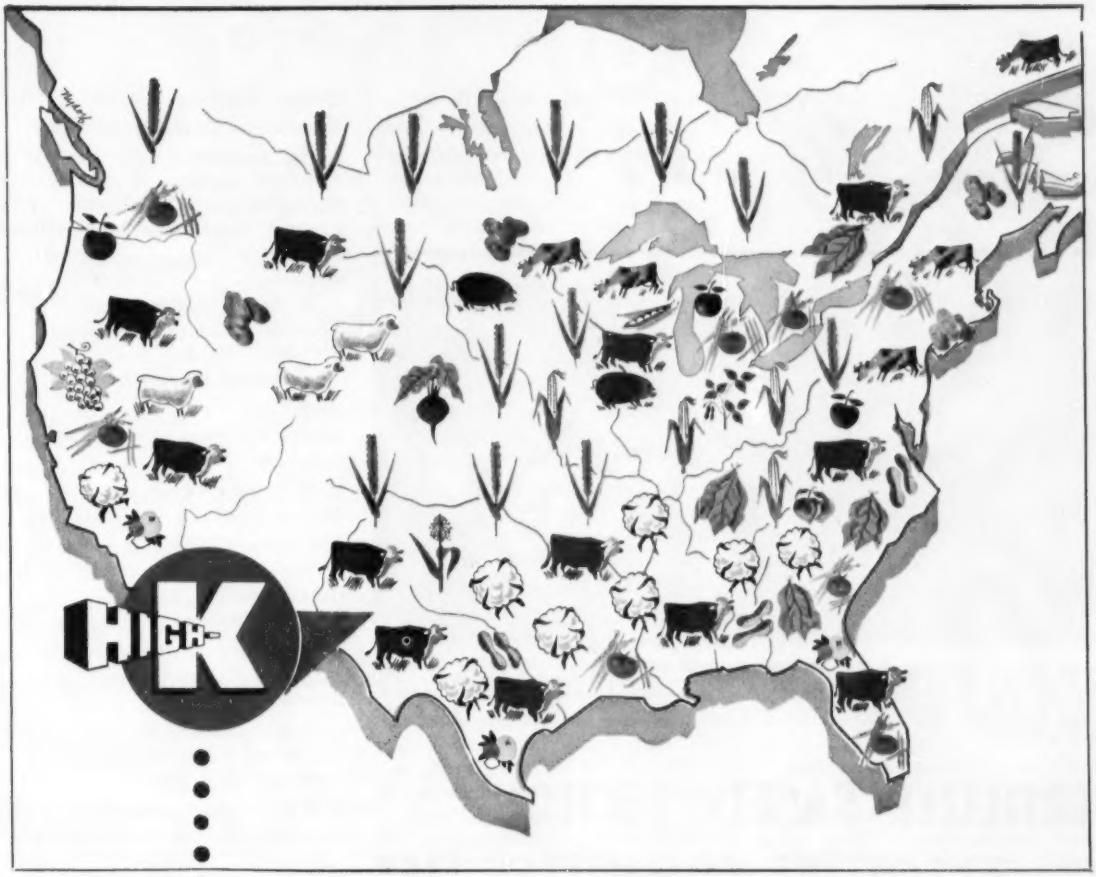
* * *

Yields of hay from perennial grasses fertilized with 40 to 60 pounds of nitrogen per acre in early spring vary directly with rainfall, according to a paper by E. C. Conard, L. C. Newell and A. P. Mazurak of the Nebraska Agricultural Experiment Station who said they conducted experiments with several cool-season and warm-season grasses, grown with and without nitrogen fertilizer, at three locations in Nebraska. Total yields of hay were low in dry years. Nevertheless, increases of 40 per cent or more were obtained from the application of nitrogen fertilizer.

Beginning in the fourth year of production, the yields from the unfertilized plots remained relatively low even though the available moisture was plentiful.

When the moisture supply was sufficient for good growth, the percentage of crude protein in the hays from the fertilized plots was about equal to or lower than that in the When moisture was limited, the hays from the unfertilized plots,

(Continued on page 70)



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Safety . . .

Stewart Washburn (right), senior engineer, National Safety Council, shows the Council's new fertilizer industry safety posters to representatives of the Smith-Douglass Co. The three men were in Chicago attending the Council's Safety Training Institute. Left to right are W. V. Waisenen, supervisor, Albert Lea plant; A. J. Edmonds, night superintendent, Streator (Ill.) plant, and W. A. Wilcox, superintendent, fertilizer dept., Norfolk plant.

FERTILIZER SAFETY SECTION EXECUTIVE COMMITTEE LIST

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Lion Oil Company
El Dorado, Arkansas

Safety Section Executive Committee Meet

The executive committee of the fertilizer section of the National Safety Council will meet at the Council headquarters in Chicago, January 13.

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Thurston Chemical Company
Joplin, Missouri

M. S. Wright, Jr.
Texas Farm Products Company
Nacogdoches, Texas

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SMITH-DOUGLASS PRINTS FIRST BOOK OF SAFETY RULES

What is said to be the first printed set of safety rules in the industry has been published by Smith-Douglass for use in their 10 plants. It leads off with a letter from the Production Manager, J. H. Zwemer, on S-D responsibility for safety, and asking for suggestions.

What follows is a set of clearly stated safety rules, illustrated with amusing cartoons. Across the pages are color bands on which are such slogans as "Think first—accidents strike quickly" . . . "Think first . . . do it the safe way."

And occasional full page cartoon emphasizes the results of carelessness, with a man in a hospital bed, a man with a baseball bat making another put a tool back where it belongs. But no horror pictures. Even a man with his hand caught in a machine is treated in cartoon style.

Vernon S. Gornto heads the S-D Safety Department.

SOUTHERN WEED CONFERENCE JANUARY 11-13

Latest developments in use of chemicals to control weeds in field crops and pastures of the South will be featured in Memphis on January 11, 12 and 13 when the Southern Weed Conference will be held at Hotel Peabody.

Conference President W. B. Ennis, of Mississippi State College, said that all phases of weed control will be reviewed. Chemical companies will sponsor exhibits depicting chemical materials used in weed control and application equipment.

Program for the three-day meeting also will include discussions of educational aspects of the problem as well as the physiological problems involved in the use of certain chemicals.

On Tuesday, January 12, the entire afternoon will be spent in discussion of cotton weed control. This will include control of trumpet vines, Johnson grass, and annual weeds and grasses that hinder cotton production. Recommended herbicides for cotton weed control will be highlighted.

Registration will start at 8:00 a.m. Monday, January 11, and the general session will start at 9:00 a.m. Dr. Warren C. Shaw, of the Department of Agriculture, Beltsville, Md., will preside over this session.

THE POTENTIAL FLORINE HAZARD IN THE FERTILIZER INDUSTRY

WALTER H. POPPE, JR., Engineer
Industrial Hygiene Division
Wisconsin State Board of Health
Madison 2, Wisconsin

Introduction

It is the aim of this report to present the findings which resulted from a series of industrial hygiene engineering studies conducted in a number of phosphate rock acidulating and fertilizer blending plants.

Early in 1949, the first of such studies was conducted at a fertilizer manufacturing plant. We were requested to investigate the source of the irritating gases which were escaping into the atmosphere and causing irritation to the eyes, nose and throat of the people living in the neighborhood of this plant. In the course of our investigation, we experienced extreme irritation of our eyes, nose and throat in the area near the acidulating operation. A few enviromental air samples were then collected, inside the plant, as well as urine specimens from the workers. The fluoride concentrations found in these samples indicated that a more thorough investigation of this new industry in Wisconsin was in order. Fluoride, like water, is beneficial to the well-being of man; however, too much of either can be detrimental.

Conclusion

The results of the engineering studies made in three phosphate rock and four fertilizer blending plants show that a definite fluoride health hazard exists in the commercial fertilizer plants wherever natural phosphate rock materials are used.

Corrective measures to eliminate this hazard have already been voluntarily taken by some of the plants. Others have been aware of the hazard but have not attempted to apply ventilation controls. Fluorine poison-

Table 1
CLASSIFICATION OF SAMPLES IN RELATION TO THE M.A.C. VALUES

ENVIRONMENTAL SAMPLES	VERY EXCESSIVE (over 9 ppm)	EXCESSIVE (6-9 ppm)	HIGH (3-6 ppm)	LOW (below 3 ppm)
Acidulating Plants (36 samples)				
No. of Samples	7	4	9	16
Percent	20	11	25	44
Blending Plants (10 samples)				
No. of Samples	4	2	2	2
Percent	40	20	20	20
URINE SPECIMENS	**VERY EXCESSIVE (over 6 Mg/M³)**	**EXCESSIVE (4-6 Mg/M³)**	**HIGH (2-4 Mg/M³)**	**LOW 2 Mg/M³) (below**
Acidulating Plants (31 samples)				
No. of Samples	15	8	8	0
Percent	48	26	26	0
Blending Plants (60 samples)				
No. of Samples	2	13	30	15
Percent	3	22	50	25

The maximum allowable concentration value (M.A.C.) for prolonged environmental exposure (8 hours daily) to gaseous fluoride compounds or fluoride bearing dust, expressed as hydrogen fluoride (HF), is 3 parts per million parts of air (ppm) or expressed as elemental fluorine (F), 2.5 milligrams per cubic meter of air (Mg/M³)

Urinary fluoride concentrations above 2.0 milligrams per liter of urine (Mg/L) indicate that excessive amounts of this element are being stored in the body.

The above classification of samples is based upon their concentration of fluorides in relation to the M.A.C. or safe level values as follows:

(1) **Low**—below the M.A.C.
(2) **High**—up to two times the M.A.C.
(3) **Excessive**—up to three times the M.A.C.
(4) **Very Excessive**—over three times the M.A.C.

Table II
OPERATIONAL CLASSIFICATION OF SAMPLES

ACIDULATING PLANTS	MIXING B.Z.	MIXING G.A.	CUTTING B.Z.	CUTTING G.A.	CONVEYING B.Z.	CONVEYING G.A.	STORAGE B.Z.	STORAGE G.A.
Environmental (36 samples)								
No of Samples	15	4	4	4	0	2	0	7
Average Conc. HF ppm	6.35	7.70	1.18	2.77	—	8.80	—	14.60
Urine Specimens (31 samples)	MIXERS		GENERAL WORK & MAINTENANCE		MATERIALS HANDLING		SUPERVISORY	
No. of Sample	8		10		8		5	
Average Conc. F Mg/L	6.47		7.86		7.35		4.08	
BLENDING PLANTS	**STORAGE B.Z.**	**STORAGE G.A.**	**CONVEYING B.Z.**	**CONVEYING G.A.**	**BLENDING B.Z.**	**BLENDING G.A.**	**PACKING B.Z.**	**PACKING G.A.**
Environmental (10 samples)								
No. of Samples	0	2	1	1	1	1	4	0
Average Conc. HF ppm	—	5.90	1.54	30.90	5.90	25.00	19.8	—
Urine Specimens (60 samples)	GENERAL WORK & MAINTENANCE		MATERIALS MANDLING		PACKERS		SUPERVISORY	
No. of Samples	18		20		12		10	
Average Conc. F Mg/L	2.90		2.86		3.67		2.89	

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National Safety Council

ing is a compensable disease in Wisconsin, consequently, the Industrial Commission is very interested in the effective control of all types of exposures to fluorides.

Toxicology of Fluoride Compounds

The following information on toxicology of fluoride compounds was observed from the Industrial Health Bulletin, volume 3, number 5 published by the New Jersey State Department of Health:[1]

"Free fluorine plays no part in toxicology since it immediately reacts with water (e.g. the humidity of the atmosphere) to form hydrofluoric acid (HF). The acute toxic effects attributed to fluorine are therefore, due to hydrofluoric acid (hydrogen fluoride), a primary irritant. It induces an inflammation in the body tissue with which it comes in direct contact; this inflammation is a physiological reaction and not merely a direct corrosion i.e. HF is a direct protoplasmic poison. The undissociated HF molecule is capable of penetrating the intact (uninjured) skin and may exert a systemic effect as well as its local irritant action. HF has been shown by Machle to be a harmful agent as a pulmonary irritant and as a volatile poison.

"Fluorides are salts of HF and biologically are very active. Besides a local irritant action on the skin and mucous membrane, they are said to act as general protoplasmic poisons whose effect may vary according to the compound and the amount involved in a single exposure.

"Fluorides are thought to act as protoplasmic poisons either (1) by precipitation of calcium or (2) by action on the enzymatic processes, or (3) by combination with the albumin of the cells.

"Absorption of F. and its compounds is said to be through the gastrointestinal tract and that of the gaseous fluorine compounds through the mucous lining of the respiratory tract. When absorption is great, a certain amount of storage occurs with bony changes. There is general agreement that absorption of abnormal amounts of fluorides may result in the storage of fluoride, particularly in the bones and teeth, and may result in bone abnormalities and systemic illness. The threshold at which storage begins and the relationships between the amount of absorption and the amount of storage has not yet been established. consequently, the significance of any specific amount of exposure either by inhalation or ingestion (mouth) in relation to the duration of exposure has not been ascertained. Human and animal studies indicate that fluoride accumulated in the bony structures may be mobilized and eliminated; although other studies indicate that the excretion of fluorides from the bones is slight or negligible until the saturation point is reached. Within limits, urinary excretion may be used as an index of fluoride storage since the amount of fluorides excreted in the urine varies directly with the amount absorbed.

"Gaseous fluorides such as HF and silicon tetrafluoride are very toxic because of their solubility and reactivity."

Phosphate rock, fluorapatite, contains approximately three percent elemental fluorine. Samples of superphosphate and settled dust from blending plants have been analyzed and found to contain approximately two percent elemental fluorine. This means that the phosphate rock acidulation process removes only about one percent of the elemental fluorine.

At one plant visited during our investigations, the working environment was so intolerable that we could not stand by our sampling equipment while the samples were being collected. It was obvious in this plant that control measures were needed. The workers were supplied with gauze type dust masks and respirators. The dust masks were of some value in preventing the inhalation of fluoride bearing dusts. The chemical cartridges for the respirators were for use as protection from organic vapors and not for the absorption of hydrogen fluoride and other acid gases which, of course, are the air contaminants present in the atmosphere of acidulating plants. The selection of the wrong type of protective equipment may be worse than providing none at all because it gives the wearer a false sense of security. It would be similar to the situation where a man selected a fly rod to use for muskie fishing. The fly rod would be adequate as long as a muskie did not strike.

Details of the Engineering Studies

Industrial fluoride exposure can either be evaluated by environmental air samples or by urine specimens obtained from the workers. In the latter case, the employees are used as the air sampling device. In our surveys, we used both methods. Air samples are time consuming to collect but easy to analyze in the laboratory, while urine specimens are easy to obtain but very time consuming to analyze. Our chemist estimates that he can analyze only a maximum of six urine specimens in an eight hour day. In this study, a total of 46 environmental air samples and 91 urine specimens were collected. It took over 3 weeks of laboratory work to analyze only the urine samples to say nothing of the time spent in obtaining and analyzing the air samples.

The management and employees of some of the plants were very interested and cooperative, others were less concerned. This resulted in a large portion of our surveys being conducted in those plants showing

the most interest. All super phosphate agricultural fertilizer manufacturing plants have similar operations so our findings should be useful to all engaged in this industry.

The environmental air samples were collected using all glass impingers connected to either electrically driven or hand operated pumps. The scrubbing medium was either distilled water or O.1 normal potassium hydroxide. The fluoride in the samples was isolated by distillation and the distillate analyzed by a standard colorimetric fluoride method. The laboratory results are given in the two following tables.

The maximum allowable concentration value (M.A.C.) for prolonged environmental exposure (8 hours daily) to gaseous fluoride compounds or fluoride bearing dusts, expressed as hydrogen fluoride (HF), is 3 parts per million parts of air (ppm) or expressed as elemental fluorine (F), 2.5 milligrams per cubic meter of air (Mg/M_3).

Urinary fluoride concentrations above 2.0 milligrams per liter of urine (Mg/L) indicate that excessive amounts of this element are being stored in the body.

The above classification of samples is based upon their concentration of fluorides in relation to the M.A.C. or safe level values as follows:

(1) **Low**—below the M.A.C.

(2) **High**—up to two times the M.A.C.

(3) **Excessive**—up to three times the M.A.C.

(4) **Very Excessive** — over three times the M.A.C.

We are also aware of the ammonia gas hazard present in this industry. This gas is a primary irritant and no worker could voluntarily remain in an atmosphere which contains a harmful concentration of this gas. The maximum allowable concentration for prolonged exposure is 100 parts per million parts of air (ppm). Ammonia gas is detectable by odor in concentrations of less than 5 ppm and concentrations of 20 ppm are easily noticeable. It becomes uncomfortable in concentrations somewhat less than 100 ppm.

The health problem for ammonia gas is not concerned with the effects of exposure to low concentrations of this gas for short periods of time, but rather with high concentrations from which a worker could not escape. Breaks or leaks in ammonia gas lines and tanks might create such a hazard. Ammonia gas masks, which will reduce the possibility of a worker being overcome from an excessive exposure of ammonia gas, are commercially available.

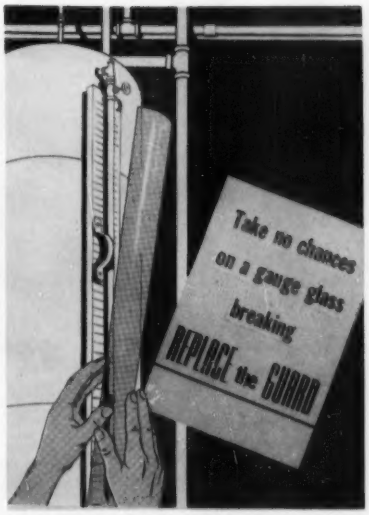
Sulfuric acid gas and mists are another possible health hazard. However, we are of the opinion that, if the hydrogen fluoride problem is brought under control in the acidulating plants, the sulfuric acid problem will also be eliminated.

The use of dynamite creates health, as well as safety, problems. Nitrous oxides and carbon monoxide gases result from the burning or exploding of dynamite. It is suggested that as much time as possible be allowed before the workers re-enter an area following the blasting.

The nitrous fumes are the most insidious of all the irritant gases. After the burning or incomplete explosion of dynamite in a tunnel, or the spilling of nitric acid on a wooden floor, or some similar slight mishap, a workman inhales some of the fumes for a time, but is little inconvenienced. He goes home and eats his supper feeling perfectly well. During the night edema of the lungs may develop with serious results.[2]

Discussion

We hope that the results of this preliminary cross-section study of the phosphate fertilizer industry has pointed out the nature of the health problems associated with phosphate fertilizer production. Dust control is of importance to you in regard to your workers' health, but you will also benefit from lessened product losses and equipment losses from corrosion. The Atomic Energy Commission handles the most toxic materials now known to man and yet has one of the best health and safety records ever established in an American industry. Awareness of the hazards and provision of adequate control measures are necessary to provide safe and healthful working conditions.



National Safety Council

In evaluating the significance of the urinary fluoride concentrations shown in Tables I and II, the following facts must be considered:

(1) the absorption of fluorides when ingested or inhaled in the form of gaseous fluorides or even insoluble dusts is very rapid and is reflected in changes of the urinary fluoride concentration from hour to hour.

(2) that spot samples collected during the last two hours of an eight hour exposure will approximate the mean daily concentration or output.

(3) that a person without previous exposure to fluorides will show a urinary fluoride output that is about equal to that of a person who is daily exposed to fluorides for the same exposure on a given day.

(4) that the rate of urinary fluoride excretion is the best method of estimating an individual's fluoride storage and that excessive storage of this element in industrial employees should be prevented or reduced to acceptable levels.

The fluoride concentrations shown in the environmental samples indi-

(Continued on page 73)

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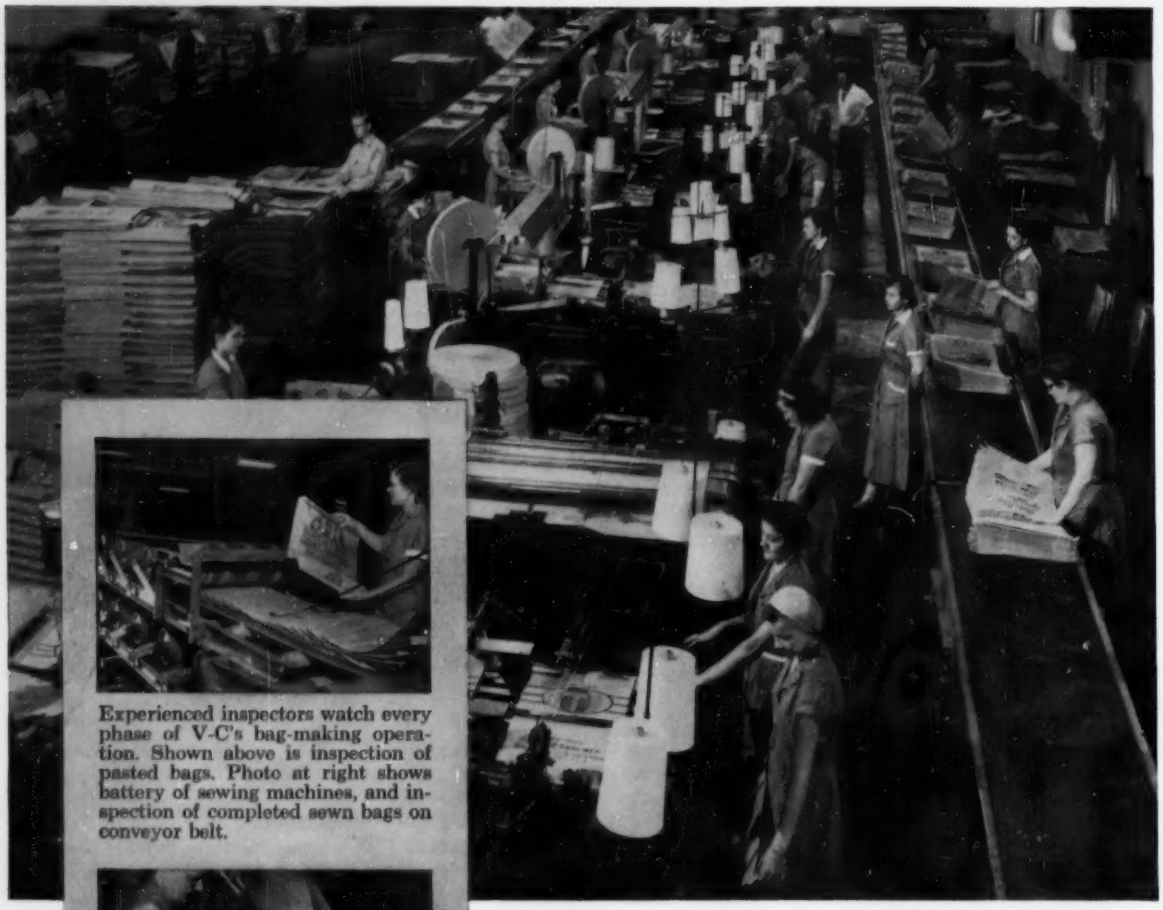

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Personals . . .

St. Regis Paper has announced these personnel changes:

Arch Carswell, who has been vice-president in charge of multiwall sales, to the newly created post of vice-president in charge of all company sales. He joined them in 1928.

Charles A. Woodcock has become general sales manager for all US multiwall bag sales, and is a vice-president of the Sales Corporation. He is succeeded by his former assistant, Vice-president Frank W. Myers, Jr. as Midwestern Sales district manager. Mr. Woodcock joined them in 1936; Mr. Myers four years ago.

* * *

Jesse D. Romaine, secretary and chief agronomist of the **American Potash Institute** has been elected chairman of the **American Chemical Society's** fertilizer and soil chemistry division. **Dr. J. Fielding Reed,** the Institute's Southern Manager is Secretary of the Southern section of the **American Society of Agronomy,** and has just been elected Secretary-Treasurer of the **Georgia Plant Food Educational Society** at their December meeting. The ACS also made **George E. Serviss, GLF,** Ithaca, N. Y., vice-chairman of the fertilizer and soil chemistry division.

* * *

His friends will be glad to know that **Edwin P. Grant, Virginia-Carolina** is out of the hospital.

Donald E. Hope has been made sales promotion assistant for **Pennsalt's** agricultural chemicals department, it was announced by **Arthur F. Bixby,** sales manager.

* * *

Dr. George R. Ferguson is now president of the newly created **Geigy Agricultural Chemicals** a separate division of the **Geigy Chemical Corp. John G. Plowden** is sales manager.

* * *

Marvin J. Briggs, general manager of the **Indiana Farm Bureau Cooperative Association** told a meeting of farmers recently that the position of farmers as of the start of 1954 is good as to cash, bank deposits and bonds, and that the demand for farm products is high. **Owen Cooper,** executive vice-president of the **Mississippi Chemical Corp.** to them that the big plant at Yazoo City is yielding $60,000,000 in added crop production per year from the $8,000,000 invested in the plant, and predicted similar results from the **Consumers Cooperative** plant, now building and Lawrence, Kansas.

* * *

Two **Virginia-Carolina** men have been promoted: **J. T. Mathews** from Superintendent at Selma, N. C. to Superintendent of the Wilmington plant, and **Grayson G. Morisette** to assistant superintendent in charge of production of organic phosphate compounds at the Charleston plant.

Marlin G. Geiger, vice-chairman of the Davison Chemical Board, who has been elected president and chief executive officer on the resignation of R. L. Hockley, who—as we reported last month—has become vice-president of Mathieson Chemical. Mr. Geiger has been with Davison since 1947, joining them as executive vice-president. Becoming vice-chairman in 1951, he has had full charge of all company activities, including the current expansion program, which involves more than $26,000,000.

Madison L. Crawford, who has been appointed advertising manager of The Frank G. Hough Co., Libertyville, Ill., makers of Payloaders. He comes to them from General Foods and Clark Equipment.

Arch Carswell, who has been promoted to the newly created post of vice-president in charge of all St. Regis Paper sales, from v-p in charge of multiwall sales.

Right, Charles A. Woodcock, St. Regis Sales vice-president, who is general sales manager for multiwall bags in the US, with New York as headquarters. He has been succeeded by Frank W. Myers, Jr., left, also a vice-president, as district sales manager of the mid-West.

Dr. Herbert R. Albrecht, associate dean of agriculture and director of agricultural and home economics extension at **Penn State,** has been made a fellow of the **American Association for the Advancement of Science.**

* * *

Smith Agricultural Chemical Company have moved **Hartl W. Lucks** from sales and advertising to be assistant purchasing agent; **Harry R. Smith** to manage the Holland branch, succeeding retired Dick Miles; R. C. Sherwood to be chief of chemists, succeeding retired John O. Holbrook: **Homer W. Dice,** a salesman with them 35 years has also retired. All three retirements took place October 31.

* * *

Elmer E. Bruer, after 38 years of service with **Armour Fertilizer Works,** retired from the post of Florida Division manager—with which division he has been associated throughout his service with the company.

* * *

Richard J. Both has been made sales manager for agricultural chemicals, Naval Stores Department, **Hercules Powder Company,** to succeed the late **Frank U. Rapp.**

* * *

Dr. Firman E. Bear, Rutgers professor of agricultural chemistry, predicted to a meeting of the **American Society of Agricultural Engineers** last month in Chicago that airplanes and helicopters will play a growing part in the application of fertilizers, especially in the use of pelletized goods on pastures and other extensive crop areas.

* * *

Osmer S. Deming, president of **Bluegrass Plant Foods,** in Cynthiana and Danville, (see Map) Kentucky, is recovering nicely from the heart condition which laid him low for a while, and expects very soon to be giving attention to his many business interests.

* * *

Lee Fryer has been appointed to the Agronomy Advisory Board of Washington State College, representing the Pacific Northwest Plant Food Association.

Claud D. Walker, Walker Fertilizer, Orlando, Florida, rates high with his fellow citizens, not only as a fertilizer man but in civic affairs as well. The local newspaper recently ran an enthusiastic letter of gratitude that Mr. Walker had accepted and been elected to head the Mead Botanical Garden there.

* * *

David G. Stenberg will head the Central Division of **National Gypsum,** the largest in area, personnel and volume of sales. This is a new division, the company's fourth. He has been succeeded as General Commodity Manager by **J. P. Nicely.**

* * *

Robert J. Zipse has joined the **John Powell** division of **Mathieson Chemical** as domestic sales manager, with R. H. Hodgson as his assistant.

* * *

John Pollard Truman, president of **J. M. Tull Metal and Supply Co.,** Atlanta, Georgia, has been elected president of the Atlanta Rotary Club, of which he has been a member for nine years.

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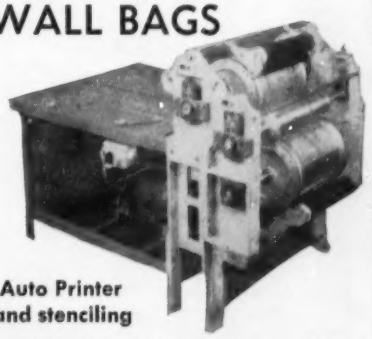

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Paul L. Weller who has been named manager of market research for Spencer Chemical Company in Kansas City, Mo. Mr. Weller had been with Wyandotte Chemicals Corporation and was previously a senior development engineer for the Goodyear Tire and Rubber Company.

The Cambridge Wire Cloth Company, Cambridge, Maryland, has announced the appointment of **Richard C. Carmean** to its sales engineering staff. Mr. Carmean will assist **Fred L. Stevenson** in sales and service work in the Ohio-Michigan-Eastern Indiana territory.

* * *

William B. McCloskey, vice-president of **Davison Chemical,** has been given responsibility for direction of the operational groups of the company—engineering, production, traffic, purchasing and industrial relations—it was announced by **M. G. Geiger,** president. These were among the executive responsibilities of Mr. Geiger as vice-chairman of the board, prior to his assumption on November 30, 1953, of the office of president and chief executive officer.

Mr. McCloskey, formerly controller of the company, was elected vice-president May 1, 1953, and since then has been on special executive assignments. A graduate of Pace Institute, he came to Davison in 1950 from the National Fertilizer Association. He served as president of the National Association of Cost Accountants in 1950-51.

* * *

The following personnel changes in its Agricultural Chemicals Division have been announced by **Mathieson Chemical Corporation:**

Three sales representatives promoted: **R. H. Dorsett** to administrative assistant in the Sales Service Department at Little Rock, Ark.; **J. W. Murphy** to district sales supervisor with headquarters at Jackson, Miss.; and **C. S. Schoolfield** to assistant sales manager, Baltimore, Md. **O. L. Robertson,** chief irrigation mechanic, becomes irrigation service representative at Williamston, N. C., and **D. R. Stoneleigh,** associate director of agricultural market development, named agricultural specialist for the Commercial Development Division in Baltimore.

Thomas Warren joins the division as a salesman in Williamston, N. C. New field sales representatives are **Earl Abbott,** Decatur, Ill.; **Lee Hays,** Richmond, Ind.; and **Paul Marshall,** St. Louis, Mo.

OBITUARIES

Harry B. Baylor, vice-president of International Minerals and Chemical Co., until his retirement several years ago, died in Charleston, W. Va. December 31.

George Cook, Jr., 70, for 30 years with Agricultural Chemical, died December 10 at his home in Charlottesville, Virginia.

Jasper L. Hall, 52, a director of Farm Fertilizer Inc., died December 8 at his home in Omaha, Nebraska.

Bernard Joseph Kane, 62, for forty years with Fulton Bag & Cotton Mills, and at his death director of purchases and cotton buyer, died December 28 at his home in Atlanta of a heart condition.

John Boschen Siegel, 69, a department manager of Vriginia-Carolina at the time of his 1948 retirement, died November 6 at his home in Richmond, Virginia.

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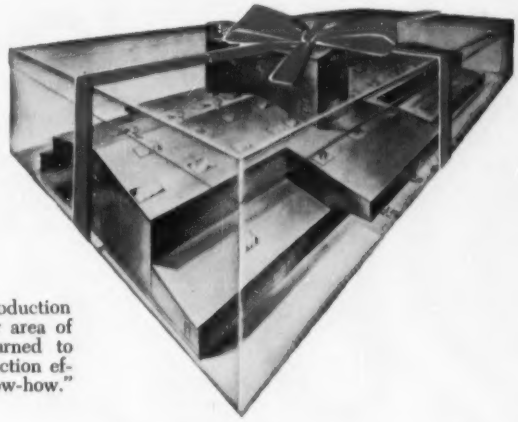

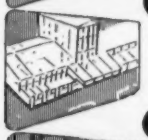

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GPFES HONORS STROBHAR

On December 9, some 400 assembled at the second annual meeting of the Georgia Plant Food Educational Society, one of the more active of the numerous local level organizations which have been listed here.

Under the presidency of Joe M. Shepherd, Virginia-Carolina, a full program was assembled which ran from 1.45 in the Fine Arts Building on the University of Georgia Ag campus, to 10 that evening at the Athens Country Club where an excellent dinner was served.

As happened at the NFA mid-year convention, a man from Tennessee stole the show, but this was not only a different man, but differently associated with our industry—J. W. Robinson, vice-president and general manager of Bradley Supply Co., fertilizer dealers at Cleveland, Tennessee. There were other highlights. Georgia's Junior Senator, and a leading exponent of farm stability, spoke much along the lines of the talk reported here during the NFA convention. An outstanding motion picture, developed by APFC and presented by Louis Wilson of that organization, was shown. Russ Coleman, NFA president, presented the Georgia figures showing how Georgia farmers would prosper if they would follow the University of Georgia fertilizer recommendations. Another motion picture, excellent in its handling, was presented by Walter S. Brown, associate director, Georgia AES. J. W. Fannin, agricultural economist, Georgia AES graphically showed what 1954 holds for the farmers of the state—and found it good. And the annual award was presented, by Billy Barton of Tennessee Corporation, to A. D. Strobhar, president of Southern Fertilizer & Chemical Company, which he organized in 1905, and who has been active in the industry since the late 80's.

The reason Mr. Robinson ran away with the show was chiefly that is it all too seldom we hear a dealer talk. And he really laid it on the line. Opening with reminiscence of his youth on a Georgia farm, where the crops they produced on their 140 acres were their entire source of income, he told of dropping out of the University of Tennessee, due to his father's poor health, and then going to work as a "flunky" at $10 per week in a hardware store—driving a truck, sweeping out, cleaning shelves. And he remembered vividly the days when he loaded many a 200 pound bag of fertilizer on the wagons of customers—and wondered, if help grew more shiftless, the industry might not be forced to 50 pound bags one of these days.

He has been in the farm supply business ever since, and his advice to dealers is a message that could well be carried on the road by every fertilizer salesman.

1. Give close consideration to location. Survey to be sure there's need for another dealership.

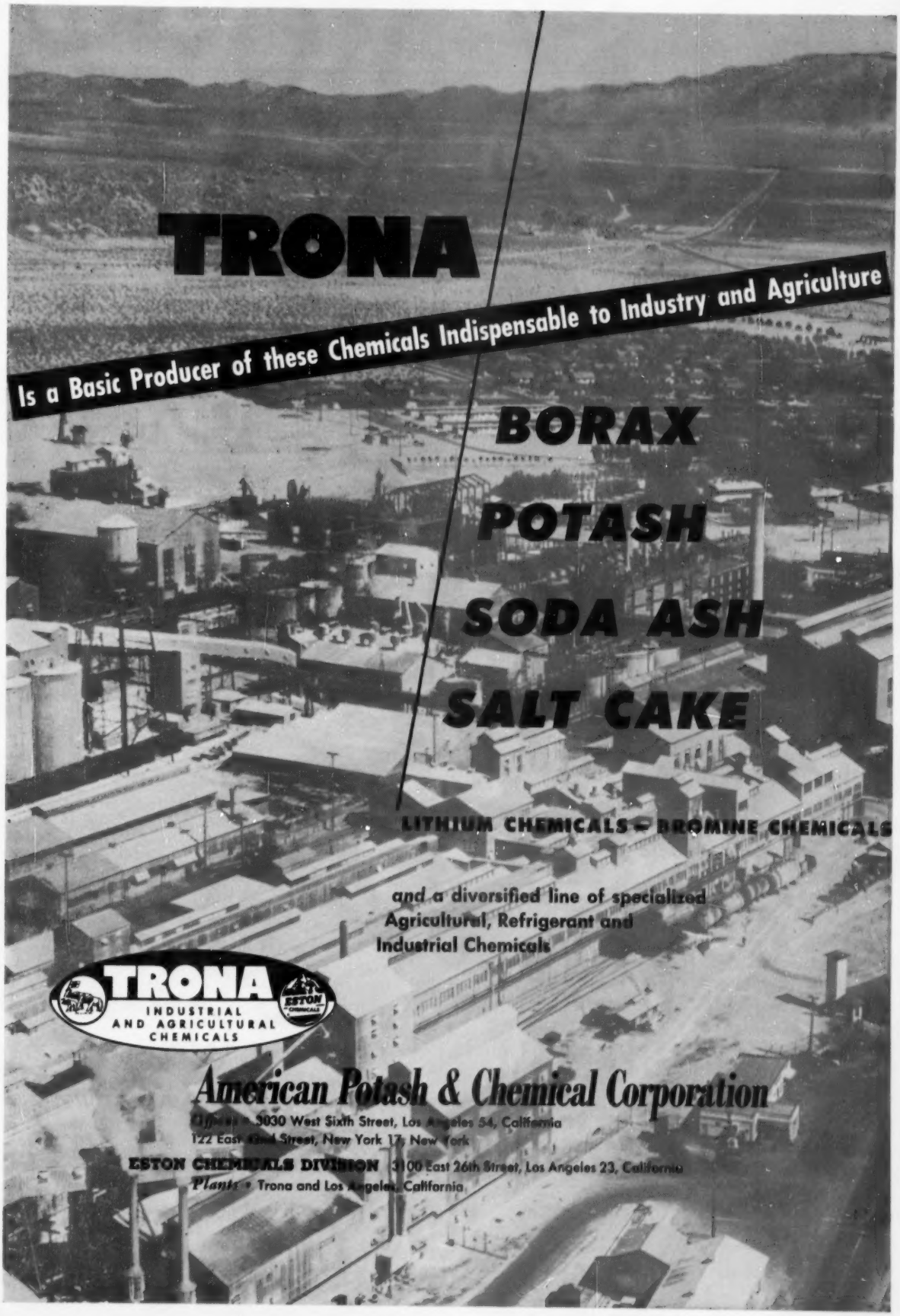
2. Be sure of adequate parking space for customers. At his place they pay for an employee parking lot away from the store so the parking area will remain free for the farmers who drive in. Salesmen have been taught politely to park somewhere up the street, not in front. And that goes for their own company trucks as well.

3. Choose reliable suppliers, always having an alternate source, but not handling too many lines. "The more different lines and brands you handle, the more confusing it is for your customers and sales people."

4. Properly identify your place of business, so people who drive by will know who you are. And keep the place looking nice, without weeds, rubbish or junk.

5. Display merchandise well inside your store, with attractive displays. Be a good housekeeper and don't let dust and torn bags accumulate. Make your place such that any lady will be glad to walk in, remembering what a high percentage of the fertilizer money is brought in by the ladies. Anyhow, sloppy looks suggest a sloppy operation and one on whose advice not

We hope you can make out these underexposed pictures:
1. Dr. O. C. Aderhold, President U of Ga., introducing Senator Russell. 2. Senator Richard B. Russell 3. New President W. A. Higginbotham, Jr., Armour Fertilizer. 4. Dr. Russell Coleman, NFA President 5. Speaker J. W. Robinson 6. Louis Wilson, APFC, introducing the new motion picture.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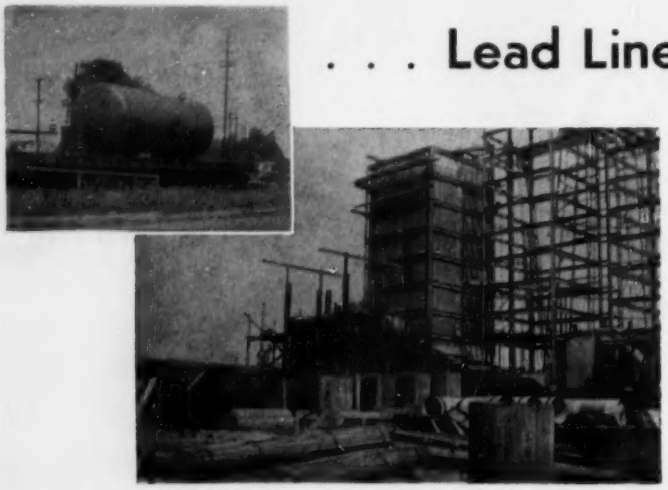

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8. Be sure you have enough telephone lines so you are not missing business because your lines are tied up.

9. Encourage the farmer to take his fertilizer home early, and not come charging in demanding quick delivery after the ground is all ready. "Too many customers will hitch to the drill, holler to their wives as they go to the field to order the fertilizer—and then sit out there and give you fits until you get there with it."

10. Keep informed of modern day fertilization methods, farming practices and farm problems so you can help your customers, and so they will know that what you advise is sound. "In most cases when a farmer comes to a dealer he has been to the Soil Conservation office, the PMA office or the County Agent, and your recommendations should be similar to theirs as you are probably the last man he will contact before he puts his seeds and fertilizer into the soil.

"And as the farmer prospers, so do you as a dealer."

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Board, Ga. Plant Food Educational Soc.

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W. P. Burke, International Mineral & Chemical, Corp., Bank Bldg., Albany, Ga.
Winston E. Shepard, Shepard Fertilizer Company, Moultrie, Ga.

1. Joe Shepherd, Virginia-Carolina Chemical, opens the meeting. 2. A report from Secretary-Treasurer Cooper Morcock, Nitrogen Division. 3. Dr. George King, Georgia Experiment Station, pinch-hitting for Dean Murray, who was called away for the afternoon. 4. J. W. Fannin, U of Ga. Extension Service. 5. Dean and Director C. C. Murray, Georgia College of Agriculture. 6. Billy Barton, Tennessee Corp., reporting on the society's grazing program. 7. Dr. King, chatting with Fred McNatt, president of the South Carolina Plant Food Educational Society. 8. Dr. Fielding Reed, new Secretary-Treasurer.

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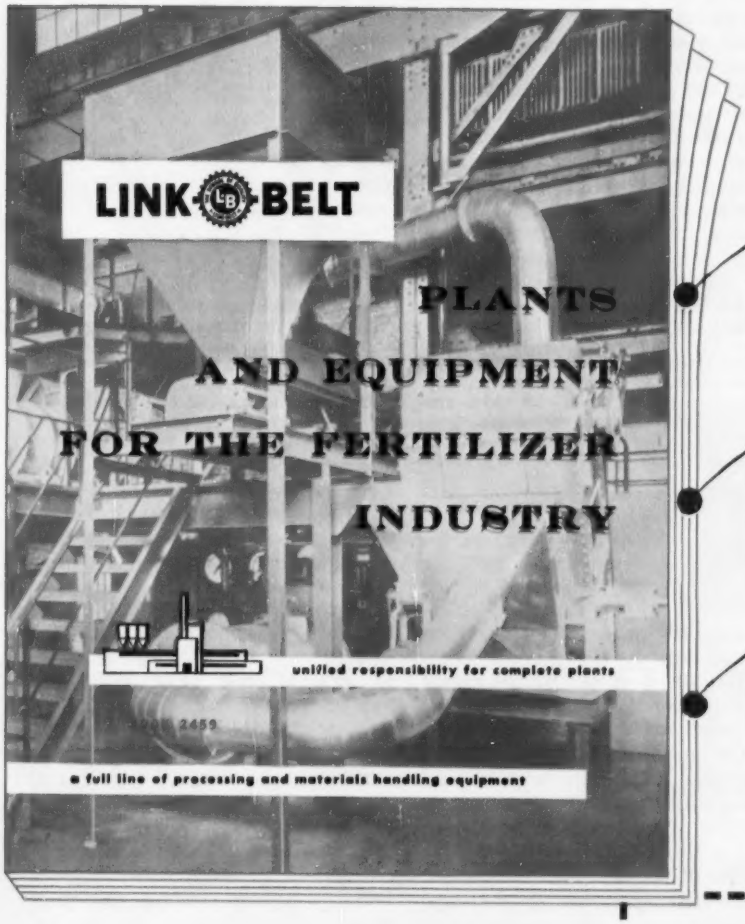

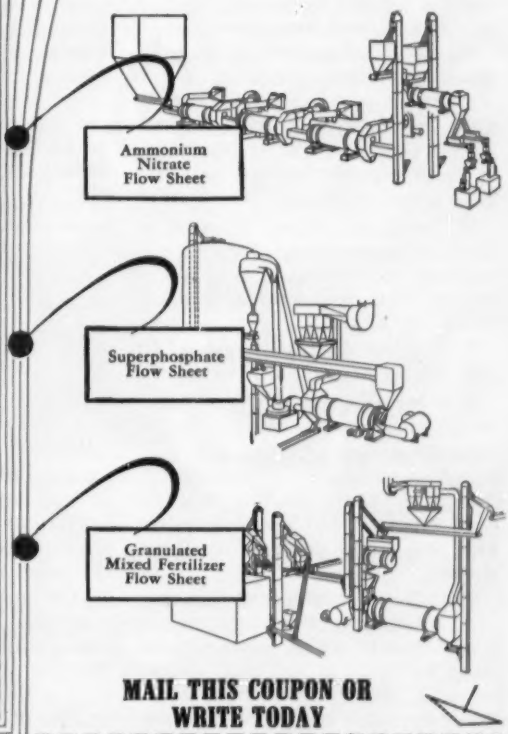

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Billy Barton, presenting this year's sole honorary award to Arthur Douglas Strobhar, president of Southern Fertilizer & Chemical Company.

11. Encourage rural youth—actively support FFA and 4-H Club members. The Vocational-Ag teachers and the County Agent will tell you how if you don't know how.

12. Don't worry about competition. Just do your job well.

13. Be honest with your customers. Expect your employees to be honest with you, giving a full day of work whether or not you are there watching them.

14. Don't cut prices. It starts a chain of price-cutting, because the customer to whom you give a cut on one item will expect it on a whole line of items.

That's the essence of what he said, but far from the way he said it.

Now let's get back and run down the program as it went:

Joe Shepherd presided and presented for the speech of welcome Dr. George H. King, Head of Experiment Stations for the University, who was pinch-hitting for Dean Murray.

J. W. Fannin took his turn at bat, with a fast-moving commentary on a well-planned set of slides. Prices about the same as last year. Farmers on a high-cost basis with little cushion against price drops. Costs to stay high because no place to cut. So net income under 1953. But remember the growth of population which is destined to put heavy pressure on the land resources of this country.

The business session that followed elected the new board which is listed here, and the meeting adjourned to the big auditorium where Senator Russell made his talk, Walter Brown presented his motion picture—and the group adjourned to the Country Club.

After a good dinner, W. B. "Billy" Barton, as chairman of the awards committee, read the citation presented elsewhere in this issue and handed the certificate of award to Mr. Strobhar, who responded briefly and modestly.

Dr. Russell Coleman, NFA president, presented a set of slides showing the gains which Georgia farms could make following University recommendations—a presentation along the lines we have reported in some detail in several previous issues since NFA began this vital program in conjunction with the Land-Grant Colleges of various states and regions.

Then came Mr. Robinson, and after that APFC's Louis Wilson introduced a 27-minute color motion picture of such technical excellence, and such sound planning that it is sure to be in wide demand. It shows plants actually growing, by way of stop-motion photography. It diagrams, via the film cartoon technique, how fertilizer is used by plants, and what happens when one of the vital ingredients is missing.

"Making the Most of a Miracle" is a picture of rare excellence from every industry standpoint, and should prove extremely helpful in presentations to farmers, or to your own salesmen as part of their sales training.

And just as the picture ended, so did the rain—which is about to become traditional with GPFES meetings.

STROBHAR CITATION

At the recent annual meeting of the Georgia Plant Food Educational Society, just one man was chosen for the annual honors that Society confers. The following, a slight condensation of the testimonial, is interesting to fertilizer people everywhere, we think, because it shows how our leaders have helped to develop the industry and, by taking one example, how leading concerns in the field have developed over the years. Mr. Strobhar's modest rejoinder when he was presented the award is typical: "They just honored me because I've been around longer than most." A reading of the following will show how very modest was that statement.

Arthur Douglass Strobhar was born in Grahamville, South Carolina, on December 26, 1875. In the late 80's he entered the fertilizer business as an employee of the Commercial Guano Company of Savannah, Georgia, as office boy. When at the turn of the century Commercial was acquired by the newly formed Virginia-Carolina Chemical Company, Mr. Strobhar was retained by the new management.

In 1905 he returned to Savannah, and organized Southern Fertilizer & Chemical Company, and serves today, as he has for many years, as its President.

The first operation of the new Company was a dry mixing plant located in rented warehouse space. It is interesting to note that the popular grades there produced were somewhat different from those now in general use. The two principal best sellers were 9-2-3, with 9% A.P.A., 2% Ammonia, and 3% Potash, and 8-2-2, with corresponding percentages of the plant foods named. It is also interesting that these mixtures were produced from materials which would now seem to us to be of extremely low grade. For instance, among the materials so used were 20% Manure Salt, 48% to 50% Muriate of Potash, 16% Superphosphate, Cottonseed Meal, Packing House Tankage and old style crude Chilean Nitrate of Soda.

The operation was successful and the Company soon outgrew its original quarters. In 1909 the Company constructed an acidulating plant on Hutchinson Island.

With the outbreak of the first World War a resulting shortage of Sulphuric Acid offered opportunity for the Company to enter the acid production field, and in 1916 a lead box chamber plant was put into operation. In the Spring of 1918 the acidulating plant was burned, but was immediately replaced by a

modern crane-type plant, which is still used.

For a time the Company engaged in the menhaden fishing and processing business with a plant at St. Marys, Georgia, producing fish scrap so long as this continued to be used as a fertilizer material. In more recent years as the business of the Company expanded, additional plants have been established in cities other than Savannah, so that the Company, in addition to two plants located at Savannah, also has plants in operation at Charleston and Roebuck in South Carolina, and at Atlanta, Georgia. The most recent step forward has been the replacement of the old chamber plant in Savannah by a new contact Sulphuric Acid plant of the very latest design.

The steady advance and proggressive attitude of Southern Fertilizer & Chemical Company is eloquent of the ability and initiative of its President. Recognition of these qualities is evident in the fact that in addition to his office in Southern Fertlizer & Chemical Company, he is also President of Vidalia Fertilizer Company, and a Director in Southern States Phosphate & Fertilizer Company, Macon-Dublin & Savannah Railroad, Chemical Packaging Corporation, Fertilizer Industries, Inc. of New York, Mid-Western Phosphate Corporation of Madison, Wisconsin.

Mr. Strobhar's position in the industry began to emerge at an early date. In 1908 Mr. Strobhar with the late Isaac Schoen, of Atlanta, L. J. Hand, of Pelham, and R. C. Neely, of Waynesboro, organized the Fertilizer Mixers Association of Georgia, and became its President. This Association contributed greatly to the advance of Georgia agricultural interests.

As chairman of a committee of the Southern Fertilizer Association, working in collaboration with a committee from the old National Fertilizer Association, Mr. Strobhar assisted in working out a merger of the two associations into the present National Fertilizer Association which he served for years as a Director, and in 1935 and 1936 as President.

In 1933 he was appointed a member of The Fertilizer Recovery Committee for the administration of the Code of Fair Competition for the fertilizer industry, and served as chairman of Zone 6, Georgia. He was appointed in 1951 to serve on the Superphosphate industry advisory committee of the Office of Price Stabilization.

Mr. Strobhar is a charter member of the American Plant Food Council and is now a member of its Board of Directors.

His interests have not been limited to the industry which forms his chosen field. He is an Elder of First Christian Church of Savannah, Georgia, and a member of the Rotary Club, the Society of Colonial Wars, the Sons of the Revolution, the Savannah Golf Club and The Oglethorpe Club. He has served for years as President of Savannah Port Society.

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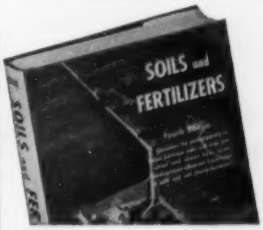

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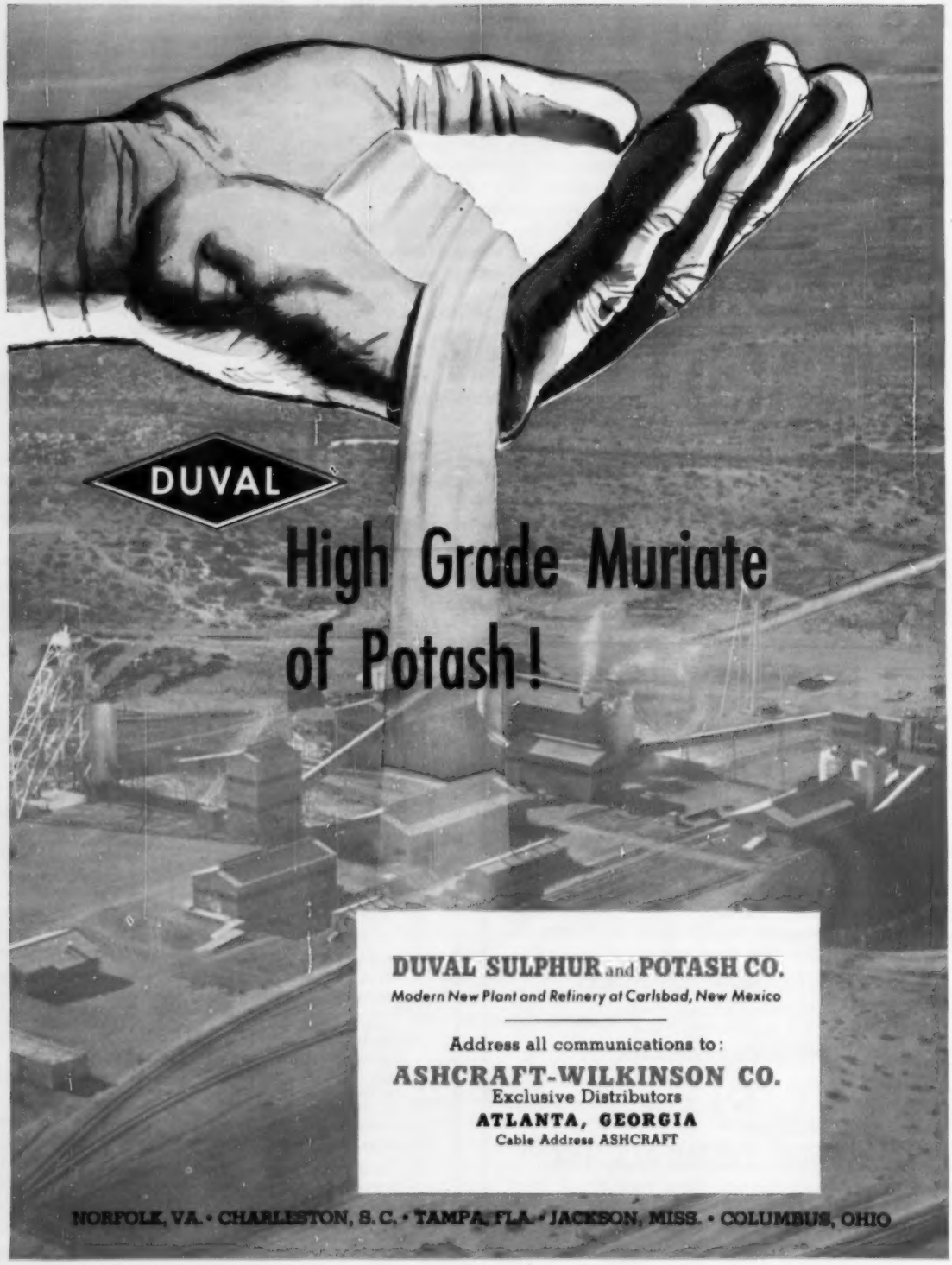
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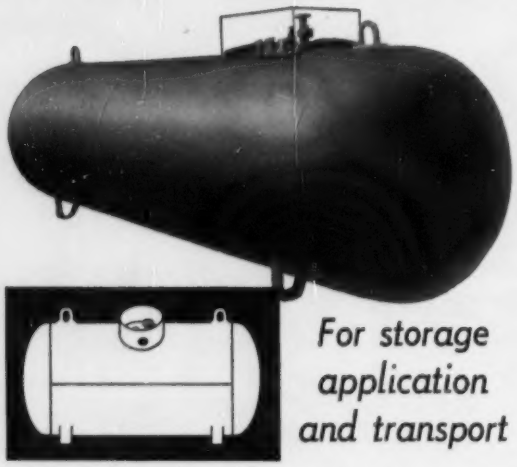

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Mr. Strobhar is today actively engaged in the management of his Company, and continues to exercise the initiative and industry which have marked the history of its development. His life and accomplishments are an inspiration to all who seek success under our cherished system of free enterprise.

As a footnote, it is proper to comment that Southern Fertilizer & Chemical Company, through its representatives, has played an active and effective part in the founding and organization of The Georgia Plant Food Educational Society.

Armour Issues Regal Book

A brochure entitled "What is your fertilizer IQ" has been issued by the industrial soap department of Armour & Co., which supplies valuable data on the use of their Regal beads for fertilizer conditioning, explaining how lumping in the bag can be eliminated, how curing time can be reduced, how fertilizer can be made ready for bagging more quickly, and other facts of importance. Copies can be secured without charge by writing Armour and Company, Industrial Soap Department, 1355 West 31st Street, Chicago 9.

Thompson-Hayward UDET Midwest Distributors

The appointment of Thompson-Hayward Chemical Co., as midwestern distributors in the agricultural field for UDET F surfactants has been announced by B. R. Bryant.

Local warehouse stocks of UDET F, an alkyl aryl sodium sulfonate, are being maintained by Thompson-Hayward with service from their headquarters at 2915 Southwest Blvd., Kansas City, Mo., and their 16 branch offices.

MARKETS

ORGANICS: Fertilizer organic market is relatively quiet although a new production of Castor Pomace originating in Texas is being sold in fair quantity at prices somewhat under other domestic productions delivered to the major consuming areas. Nitrogenous Tankage producers are still in a well-sold position at prices varying from $3.15 to $4.50 per unit of Ammonia, f.o.b. production points. Imported Nitrogenous Tankage, in limited quantity, is available at around $4.35 to $4.55 per unit of Ammonia, CIF Atlantic ports.

CASTOR POMACE: Northeastern producers continue to offer at $25.00 per ton bagged f.o.b. production points. Imported Castor Pomace varies in price from around $30.00 to $34.00 per ton, bagged, CIF Atlantic ports.

DRIED BLOOD: The New York market is rather quiet at prices around $7.00 f.o.b. New York area, for unground material. The Chicago market is around $7.75 to $8.00 per unit, ammonia in bags, for unground material.

POTASH: Muriate of Potash demand continues to lag but is expected to increase in the near future. Prices remain firm and unchanged. Imported material continues available at around 50¢ to 57¢ per unit K_2O, bulk, exvessel Atlantic ports. Sulphate of Potash is indicated at around 90¢ exvessel Atlantic ports.

GROUND COTTON BUR ASH: This source of Potash, primarily in the form of Carbonate of Potash, continues available for prompt and future shipment at prices approximating the cost of Domestic Sulphate of Potash delivered destinations.

PHOSPHATE ROCK: Supply situation is comfortable and domestic movement to acidulators somewhat below normal probably on account of drought conditions in the midwest and other parts of the country. Prices continue stable.

SUPERPHOSPHATE: Supply situation is comfortable with no scarcity of either normal or Triple at present.

AMMONIUM NITRATE: The market continues its tight position as regards supply and demand is increasing.

SULPHATE OF AMMONIA: It is reported that demand is increasing and helping to relieve the congested situation. Prices continue stable and producers meeting the $44.00 per ton bulk price f.o.b. cars at ports.

NITRATE OF SODA: Price situation remains unchanged and steady. Demand is in seasonal dimensions and stocks of both imported and domestic appear to be adequate.

CALCIUM AMMONIUM NITRATE: Several brands of this 20.5% Nitrogen material are available in bulk at $48.25 and in bags at $51.25 per ton f.o.b. cars at several Atlantic and Gulf ports.

GENERAL: Rain is still needed in the midwest and for lack of it, movement of fertilizer has been behind schedule. In some parts of the country, particularly cotton growing sections, the recent announcement of cuts in cotton acreage by the Government has upset normal fertilizer buying habits and rather little mixed goods are moving, particularly in the southeast at present.

PESTICIDES

NAC Sets Up New Info Program

A new herbicide program has been established by the National Agricultural Chemicals Association to collect and disseminate information on weeds and on the chemicals used in their control, according to Lea S. Hitchner, executive secretary of the Association.

The purpose of this program, according to Hitchner, is to speed up the distribution of information to farmers on herbicides and crop defoliants as this information arises from research.

"We want to bring to the attention of farmers the economic gains which are possible through the use of these chemicals. With the increased farm labor costs and the softening of the market for commodities, we believe that weed killers and defoliants present a real potential to increase the farmer's net return."

Jack Dreessen, who has been employed to carry out the NAC Herbicide program, joined the NAC staff in Washington, D. C. January 1, 1954. He was employed by the Agronomy Department of the Oklahoma Experiment Station, Stillwater, Oklahoma.

Hitchner stated that Dreessen's duties will be to cooperate with all interested groups and individuals who work with weeds, herbicides, and defoliants and to coordinate as many activities and results of research work as is possible. Part of the duties of the herbicide specialist will be to contact experiment stations, both Federal and State, and to work with the pesticides industry, utility companies, reclamation companies and similar groups who are conducting programs for the control of weeds and brush.

Information arising from this new program, according to Hitchner, will be disseminated through the Association's NAC News, the NAC press services, and all other outlets which will reach the leaders of agriculture.

Colorado Association Meeting January 29

The Colorado Agricultural Chemicals Association has announced that its annual joint meeting with the State Agricultural Clearing Committee will be held on January 29, 1954 at the Cosmopolitan Hotel in Denver. Proposed changes in the agricultural chemicals recommendations for Colorado are reviewed and discussed at these joint sessions.

Claine Titensor, President of the Colorado association, has requested that those industry people planning to attend give advance notice to the association's Secretary, W. D. Smith at P. O. Box 5510, Denver, so that adequate arrangements will be assured. Advance reservations are also needed for the ladies' night banquet which follows the meetings.

Hercules Moves Maxwell South

James W. Maxwell, a member of Hercules Powder Company's toxaphene sales group, is being transferred to the Atlanta district.

He joined Hercules in the summer of 1952, and has been a member of the toxaphene sales group in the Chicago district, working with Midwest federal, state and county agricultural agencies, and with farmers, on the application of toxaphene insecticides.

Hercules Presents 4-H Scholarships

The six national winners of $300 college scholarships in the National 4-H Entomology Awards Program were announced at the opening of the 32nd National 4-H Club Congress. This is the second year of competition in the Entomology Awards Program this year.

A buffet supper honoring the national and sectional winners was given by Hercules. Hercules officials present at the supper included Arthur Langmeier, assistant general manager, Naval Stores Department; M. R. Budd, director of advertising; R. T. Yates, assistant director of sales, Naval Stores Department; and R. J. Both, sales manager, Agricultural Chemicals, Naval Stores Department.

More than 1800 persons attended the 32nd National 4-H Club Congress, which was in session from November 29-December 3. The delegates represent all 48 states, three territories, and 19 foreign countries.

Chemical Exposition Held Fertilizer Interests

The chemical exposition which covered five acres in Philadelphia's big convention hall last month, held much of interest to our industry. A nitro-phosphate plant model, showed the whole operation in graphic style.

Many visitors were especially interested in new structural materials, and in fabrications developed for the processing of chemicals. One of the most evident trends was that toward continuous operation, in all processing field.

(Continued on page 78)

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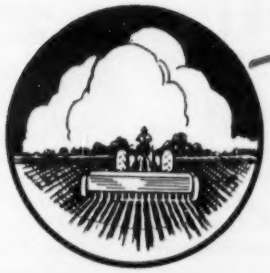

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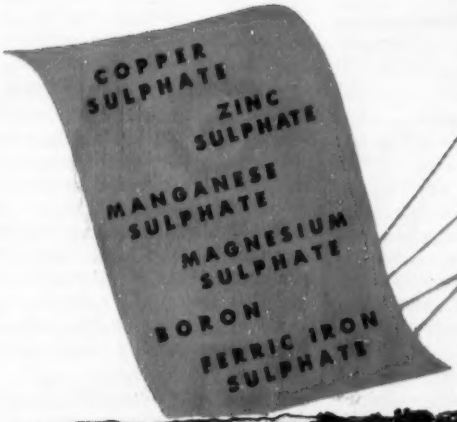

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BELTWIDE CONTROL MEET ATTENDED BY 500

Modern insecticides do a better job of controlling bugs today but may be harmful to man and animals if used excessively or carelessly.

This statement came from the seventh annual Beltwide Cotton Insect Control Conference, meeting at Hotel Peabody and sponsored by the National Cotton Council.

More than 500 chemical representatives, entomologists, and cotton leaders attended the two-day conference which spotlighted the pink bollworm problem now threatening the Cotton Belt.

The sessions also included discussions of the boll weevil and other cotton pests, stressed proper application and timing of insecticides, and urged better insect control to increase yields during the forthcoming acreage curtailment. Systemic control and insect resistance to poison were discussed.

Preceding the conference, entomologists representing state and federal research and extension organizations met to discuss progress and to formulate plans for 1954 in cotton pest control.

These specialists issued a preliminary report describing various insecticides and their uses. This also detailed the major cotton pests and general procedures for controlling them.

State cotton insect control recommendations were released also for South Carolina, Georgia, Alabama, Mississippi, Arkansas, Texas, and California.

The preliminary conference report included the following information on DDT, Demeton, Endrin, and Dieldrin, along with descriptions of other poisons used in controlling cotton pests:

(1) "DDT will control the bollworm, the tobacco budworm, the pink bollworm, the fall armyworm, the tarnished plant bug, and other lygus bugs, the garden webworm, the cotton leaf perforator, the western yellow-striped armyworm, the beet armyworm, darkling ground beetles, flea beetles, the white-lined sphinx, the green stink bug, the southern green stink bug, the rapid plant bug, the cotton flea-hopper and thrips.

"It will not control the boll weevil, the cotton leafworm, the cabbage looper, the salt-marsh caterpillar, spider mites, the cotton aphid, the Say stink bug, and grasshoppers.

"DDT is toxic to certain plants such as cucurbits. Its toxicity persists and accumulates in the soil. Therefore, it should be used only in the minimum amounts recommended for cotton insect control, especially on light, sandy soils. Contamination of adjacent crops from drift should be avoided.

(2) "**Demeton** (Systox) is a systemic insecticide and has contact and fumigating action. When applied as foliage sprays it is effective against cotton aphids and spider mites for a period of from two to eight weeks at (recommended) dosages. It does not control the boll weevil, the bollworm, the cotton leafworm, thrips, the pink bollworm, or grasshoppers at the dosages that are effective against mites and aphids.

"Demeton is a dangerous poison. It is much more toxic to warm-blooded animals than most poisons used in cotton insect control. Therefore, it should be handled with extreme caution and manufacturers' directions should be strictly followed.

(3) "**Toxaphene** will control the boll weevil, the fall armyworm, garden webworm, the cotton leafworm, and grasshoppers when applied at two to three pounds to the acre.

(4) "**Endrin** is effective against the boll weevil, the bollworm, salt-marsh caterpillar, and the cabbage looper when applied at the rate of 0.2 to 0.5 pounds per acre; against thrips, the cotton fleahopper, lygus bugs, and the cotton leaf perforator at 0.1 pound per acre; and against the cotton leafworm at 0.2 pounds per acre. Endrin has not controlled spider mites, or the pink bollworm.

(5) "**Dieldrin** will control the boll weevil, thrips, stink bugs, the cotton fleahopper, lygus bugs, the fall armyworm, and grasshoppers. It is not effective at low dosages for bollworm control and DDT should be added when control of this insect is necessary. Spider mites and aphids may increase where dieldrin is used. It is toxic by skin absorbtion, by inhalation, and by ingestion. It is recommended for use on cotton only where persons applying it will follow the precautions prescribed by the manufacturers."

Similar recommendations were listed for 24 other insecticides and miticides. Next year's conference will be held in Dallas, Texas.

Soils of New England Growing More Fertile

New England soils are more fertile than they were 200 years ago despite the fact that they have been cultivated longer than any other soil in the United States. This encouraging statement was made Dec. 28 by Dr. C. L. W. Swanson, head of the Soils Department at The Connecticut Agricultural Experiment Station, in a report before the section on agriculture of the American Association for the Advancement of Science.

Comparing New England's soils with those of the mid-West, Dr. Swanson said that "we have here built into or made fertility rather than the built-in or natural fertility of midwestern soils." In New England, the top soil was never more than 2 or 3 inches thick, while in Iowa a top soil often measures from 12 to 18 inches under virgin prairie. However, the light, sandy soils of New England respond readily to fertilizer applications. Their single-grained structure allows for good aeration and rapid oxidation of organic materials, which means nutrients are quickly made available to plants.

Where a fertility decrease was noted, nitrogen was the element which is being removed faster than it is being replaced. This, plus the loss of organic matter mentioned above, is cause for concern in some intensively cultivated areas.

Pacific Northwest Plant Food Association

The 5th annual fertilizer conference, conducted by this association is scheduled for July 2-22 at Klamath Falls, Oregon. A. R. Halvorson of the Experiment Station there is program chairman.

The Benedict Farm project has been financed by funds on a voluntary basis to take care of the third and final year. Future projects will by financed one-third by the Association, one third by the local community, one third by the farmer, if he can handle it, otherwise the association will also finance his share.

New Officers: President E. W. Hansen, J. R. Simplot Co., Boise, Idaho, Vice-President Sid Martin, Yakima Valley Spray Co., Yakima, Washington. Treasurer: Frank Meeker, Meeker-Hughes Co., Salem, Ore. Secretary: Leon S. Jackson, Leon S. Jackson & Associates, Portland, Oregon.

Board Members: Lee Fryer, The Chas. H. Lilly Co., Seattle, Washington. Lyman Judson, Lynden, Department Store, Lynden, Wash. Fred Parcher, Carstens Packing Co., Tacoma, Washington. Frank Burlingham, Woodburn Feed & Supply Co., Woodburn, Oregon.

COMMITTEES APPOINTED

Oregon Fertilizer Law: Ross Hughes, Meeker-Hughes Co. Chairman, Salem, Oregon; Alec Runciman, Webfoot Fertilizer Co., Portland; Karl Baur, Pacific Supply Cooperative, Portland.

Washington Fertilizer Law: Lee Fryer Chairman, The Chas. H. Lilly Co., Seattle; Sid Martin, Yakima Valley Spray Co., Yakima; Frank Taylor, Oregon-Washington Fertilizer Co., Seattle; Henning Waltersdorph Magnolia Fertilizer Co., Seattle.

Idaho Fertilizer Law: Jack Wursten, Chairman, Simplot Soil Builders of Idaho Falls, Idaho Falls; Bud Newcomb, Moron Fertilizer Co., Twin Falls; Ralph Nyblad, Simplot Soil Builders of Caldwell, Caldwell.

Membership Reclassification: Robert Finch Chairman, Swift & Co., North Portland; Alec Runciman, Webfoot Fertilizer Co., Portland; Frank Meeker, Meeker-Hughes Co., Portland.

Oregon Farm Project: Karl Bauer, Pacific Supply Coop., Portland; Dr. A. R. Halvorsen, Klamath Falls; Ray Pendleton, Corvallis.

FIRST HALF 1953 PHOSPHATE ROCK FIGURES

Phosphate rock produced in the United States in the first half of 1953, according to reports of producers to the Bureau of Mines, Department of the Interior, broke all previous records with a 14 per cent increase above the same period in 1952. In previous years, this production was recorded as mine production while actually it was a composite of salable products from washers and concentrators of Florida hard rock, Florida land pebble, and Tennessee brown rock; drier production of Florida soft rock (colloidal clay); mine production of Western rock plus tonnages of Florida land pebble and Tennessee brown rock ore (matrix) used directly.

Phosphate rock sold or used in the United States during the first 6 months was 10 per cent more than in the same period of 1952, with increases in Florida, Tennessee, and the Western States, of 1, 21, and 92 per cent, respectively.

Increased production of phosphatic shales in the Western States for the manufacture of elemental phosphorus resulted in lower average values for phosphate rock at the mines.

Stocks of phosphate rock in producers' hands increased 56 per cent above the same period in 1952, to 2.8 million long tons on June 30, 1953.

Prepared by ROBERT RUHLMAN, Commodity - Industry Analyst, and GERTRUDE E. TUCKER, Statistical Clerk, under the supervision of W. F. DIETRICH, Chief, Ceramic and Fertilizer Materials Branch, Minerals Division, November 1953.

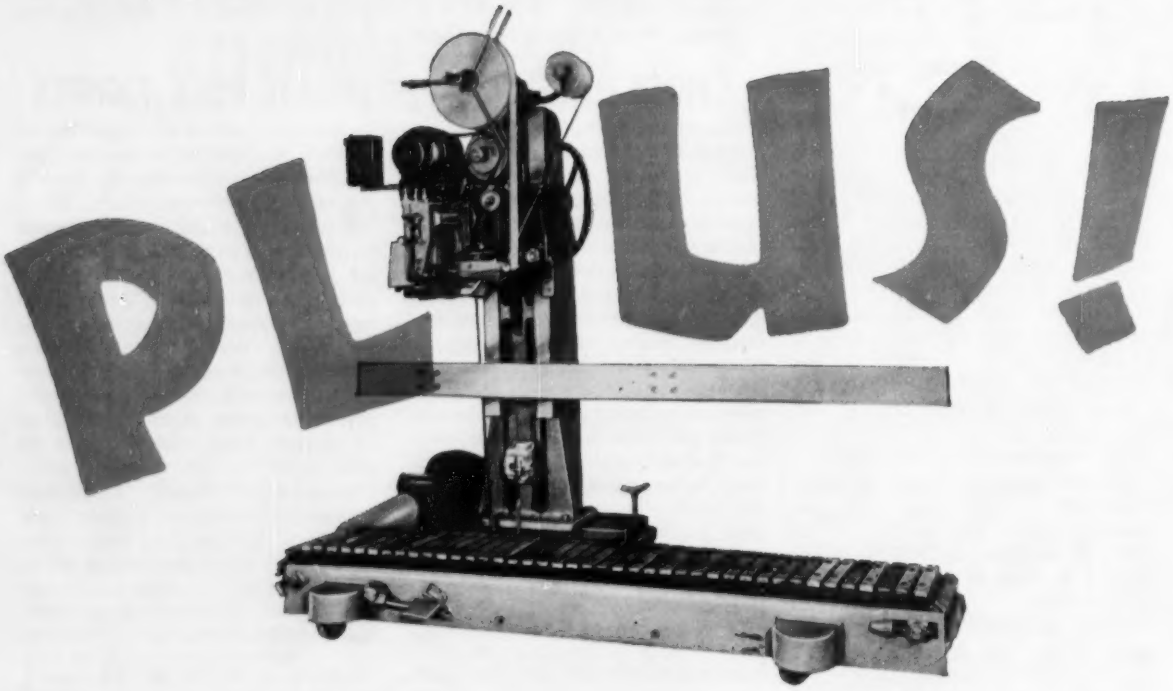
Salient statistics of the phosphate rock industry in the United States, January - June, 1952 and 1953

	1952				1953			
	Long tons		Value at mines		Long tons		Value at mines	
	Phosphate rock	P_2O_5 content	Total	Average	Phosphate rock	P_2O_5 content	Total	Average
Production 1/	5,733,922	1,859,909	(2)	(2)	6,563,805	2,109,907	(2)	(2)
Sold or used by producers:								
Florida:								
Land pebble	4,504,050	1,515,136	$26,928,443	$5.98	4,545,849	1,527,821	$27,027,634	$5.95
Soft rock	42,060	8,690	238,061	5.66	28,673	5,950	175,981	6.14
Hard rock	40,702	14,343	313,815	7.71	40,861	14,399	316,768	7.75
Total Florida	4,586,812	1,538,169	27,480,319	5.99	4,615,383	1,548,170	27,520,383	5.96
Tennessee	682,834	185,085	5,028,824	7.36	826,046	217,798	6,274,695	7.60
Western States:								
Idaho	170,549	52,024	886,670	5.20	467,570	123,100	1,330,581	2.85
Montana					234,704	65,390	1,549,597	6.60
Utah	230,557	68,003	1,622,634	7.21	(3)	(3)	(3)	(3)
Wyoming					3/ 68,097	3/ 21,600	3/ 458,690	3/ 6.74
Total Western States	401,106	120,027	2,549,304	6.36	770,371	210,090	3,338,868	4.33
Total United States	5,670,752	1,843,281	35,058,447	6.18	6,211,800	1,976,058	37,133,946	5.98
Stocks in producers' hands June 30:								
Florida	1,061,000	351,000	(2)	(2)	1,957,000	645,000	(2)	(2)
Tennessee 4/	507,000	140,000	(2)	(2)	494,000	136,000	(2)	(2)
Western States:	265,000	71,000	(2)	(2)	400,000	107,000	(2)	(2)
Total Stocks	1,833,000	562,000	(2)	(2)	2,851,000	888,000	(2)	(2)

1/ **Florida:** Salable products from washers and concentrators of land pebble and hard rock, plus a small tonnage of land pebble ore (matrix) used directly and drier production of soft rock (colloidal clay).
Tennessee: Salable products from washers and concentrators of brown rock, brown-rock ore (matrix) used directly, and a small quantity of white rock in 1953.
Western States: Mine production of ore (rock).
2/ Data not available.
3/ Utah included with Wyoming.
4/ Includes a small quantity of washer-grade ore (matrix).

Interior, Duplicating Section, Washington 25, D. C.

The Bag Closing Machine With a Real



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The Model ET ties in with your existing filling and weighing equipment...closes open-mouth, multiwall paper bags semi-automatically... gives you sift-free, stronger, more economical bag closures with the famous BAGPAK cushion stitch.

You can count on the model ET BAGPAKER to give you faster packaging and better product protection...at lower cost.

Model ET applies famous "Cushion-Stitch" over dry tape for sift-proof closure. Model E-1 applies "Cushion-Stitch" only, for use where sift-proofing is not essential.

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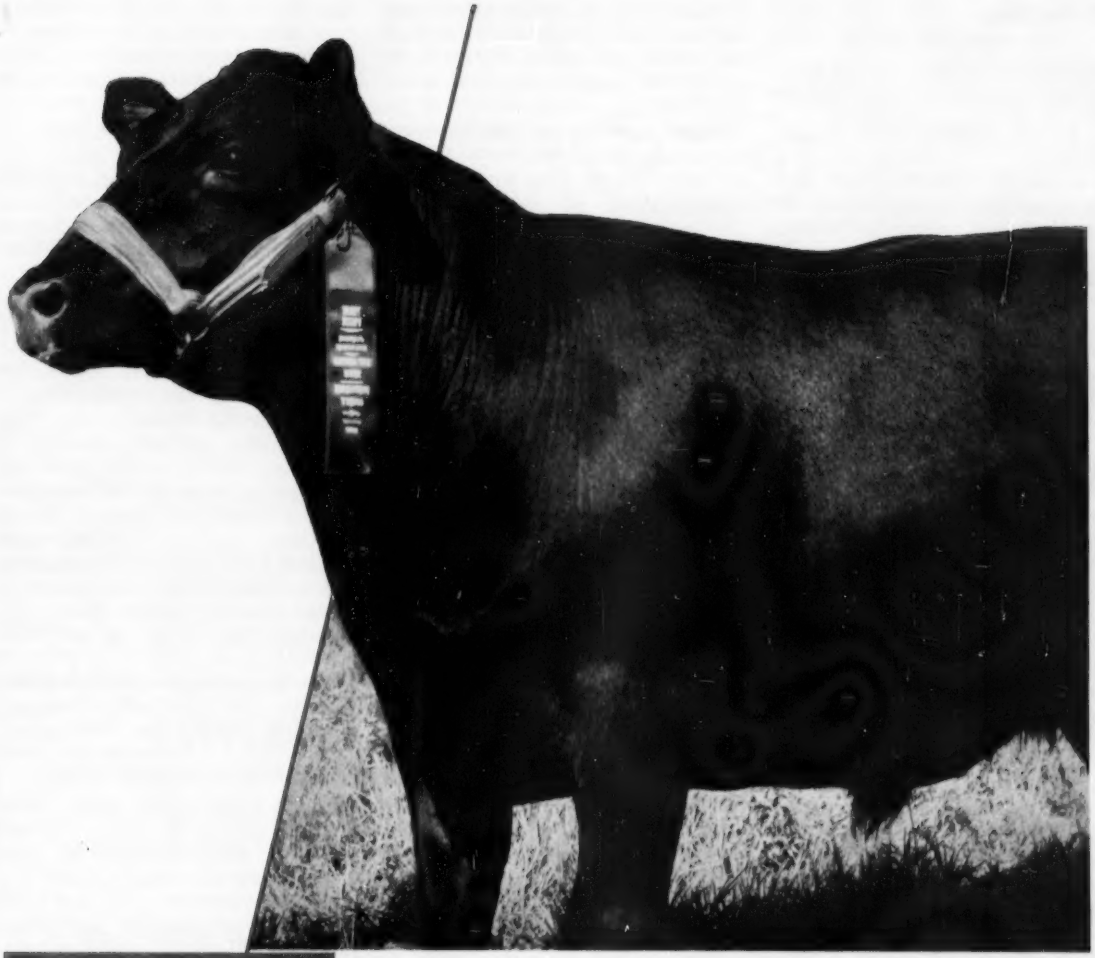

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ASA & SSA

(Continued from page 38)

crude protein content of the fertilized hay was considerably greater than that of the unfertilized hays.

• • •

A major threat to sustained crop production under irrigation is the accumulation of sodium in the soil, reported C. W. Chang and H. E. Dregne. Research conducted at the New Mexico Agricultural Experiment Station on this project has shown, under controlled experimental conditions, that cotton and alfalfa, the two most important irrigated crops in the Southwest, differ in their degree of tolerance to alkali conditions. Cotton grows well at sodium levels in the soil that adversely affect alfalfa yields. Only when the soil sodium is unusually high is the growth of cotton reduced materially.

• • •

The use of nitrogen and phosphate fertilizers greatly improved the composition of forage in sandhill meadows, according to C. R. Krishnamurthi and Leon Chesnin of the Nebraska Agricultural Experiment Station.

Where experimental meadows contained only grasses, nitrogen contributed most toward improving the composition of the forage from the standpoint of crude protein, Krishnamurthi and Chesnin said. Where legumes were present in the forage, phosphate fertilizer applied alone or with nitrogen fertilizer greatly increased the crude protein content, phosphorus content and calcium content of the forage.

Boron produced striking increases in the yield of white clover seed in Mississippi, according to Dr. U. S. Jones. Dr. Jones reported on a research project which he and W. D. Edwards conducted at the Mississippi Agricultural Experiment Station at State College.

White clover seed production was doubled when boron was added to soils at two locations in North Mississippi and increased yields were also obtained at three other locations. Soils lowest in organic matter responded best to boron, Dr. Jones reported. Forage yield response to boron was less evident at all sites than that of seed.

Lime increased white clover forage yields at all locations but at several places there was little or no increase after the first year. Three liming materials, calcium silicate, calcitic and dolomitic limestone, were compared but there was little difference among the three for increasing the pH and base content of the soil.

• • •

Increased grass growth made possible by the use of nitrogen fertilizer apparently resulted in a potassium shortage which retarded clover growth in grass-clover mixtures in a test at the Agricultural Experiment Station of Virginia Polytechnic Institute.

A joint paper by Drs. R. E. Blaser, C. I. Rich, and A. L. Johansen of the Virginia Station gave the results of the test.

• • •

Applications of 2, 4-D to soil shortly after corn planting have permitted a delay of the start of cultivation and greatly increased efficiency of later cultivations, it was reported in a paper presented by D. W. Staniforth and A. L. Bakke, research botanists at Iowa State College.

Staniforth and Bakke applied ester-type 2, 4-D shortly after corn planting at rates of 1 and 2 pounds of actual chemical per acre. And based on 5 year's results, they have found that the weed killers have slowed germination and early growth of the grass weeds.

In the experiments, the research men compared the pre-emergence treatment and delayed cultivation with untreated corn cultivated early and untreated corn which was hand weeded to remove the grasses. They found that corn grown on plots that received the chemical treatment and delayed cultivation produced yields that were equal to or higher than those of corn on ground not treated and cultivated early. And in many cases, corn on treated plots approached the yields of weed-free plots.

The heavier rate of weed killer, they reported, held back the grasses more effectively than the lighter rate, but after cultivations there was little difference in final results.

Where moderate to heavy rains followed application of weed killers, Staniforth and Bakke found some damage to corn roots in sandy soil where 2 pounds per acre had been applied. There was no damage to roots for either rate on other soils.

They found, also, that 2, 4-D treatments applied 8 to 10 days after corn came up gave good control of grasses, but often caused reduced corn yield.

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Calcium content —$CaCo_3$ value	52.47%
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Applications of 2, 4-D to the soil in late fall are more effective than spring treatments in killing deep-rooted perennial weeds in Nebraska, according to Neal E. Shafer of the Nebraska Agricultural Experiment Station.

* * *

Millions of acres of brush-choked land in the Southwest can be converted into productive pasture simply by removal of the brush, soil conservationist Harry Elwell reported. Elwell has tested machines and chemicals extensively in brush control tests at the Red Plains Conservation Experiment Station, Guthrie, Okla. The research dates back to 1935. Once the scrub oak, persimmon, and other brush are removed, the grass thrives, spreads, and soon is able to support far more livestock than before.

Selective herbicides, which kill the brush without doing appreciable harm to the grasses, are the safest way of doing the job, according to the tests at the Red Plains station. They should be applied when the plants are approaching full leaf.

Low-volatile ester formulations have generally given best results. They may be sprayed on the leaves, on the lower part of the trunk or stem, or on stumps. Results from each of these methods of application were satisfactory when used on brush within the limits for which each method was best suited.

* * *

Two soils can be similar in all other respects, but if the gravel content of the two varies, they are still vastly different in structure and performance. Results of a study on the distribution of coarse particles in four Connecticut soils and the effect this has on such factors as productiveness, aeration, moisture-holding capacity and erosion were reported by Dr. C. L. W. Swanson, A. Ritchie, Jr., and H. A. Doehne, all of The Connecticut Agricultural Experiment Station.

Equally important with the total amount of gravel in a soil is the way it is distributed—whether it occurs near the surface or in the deeper layers of the soil.

* * *

Nebraska Experiment Station tests show that subtilling and plowing affect the phosphorus content of soil. L. V. Withee and T. M. McCalla reported that experimental plots of soil which had been subtilled for 13 and 15 years contained more phophorus in the surface inch than did plots that had been plowed for the same number of years.

In the 1-3 and 3-6 inch depths, the tillage treatments had little effect on phosphorus content.

* * *

Nutrient contents of crops grown on soils treated with a soil conditioner were affected significantly in greenhouse experiments reported by

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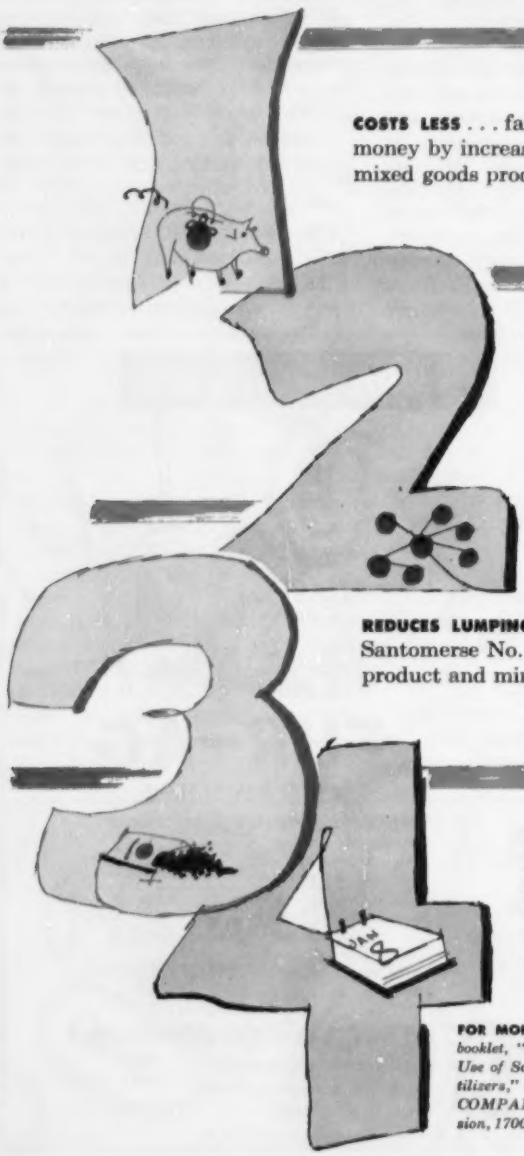

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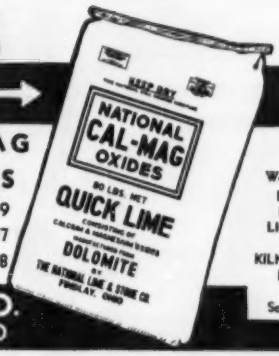

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Dr. W. H. MacIntire, Head, Chemistry Department, University of Tennessee Agricultural Experiment Station.

The addition of the soil conditioner caused decreases in the calcium and magnesium content of and uptake by red clover and millet, and increases in uptake of potassium and sodium, as a general trend, Dr. MacIntire pointed out. The experiments were conducted with seven silt loam soils, limed and unlimed, using different rates and placements of the conditioner.

* * *

Experimental irrigated potato plots which were rotated with alfalfa showed better soil structure and gave higher yields of tubers than plots on which alfalfa was not grown, said A. P. Mazurak, V. T. Valassis, and L. C. Harris, describing work at the Scotts Bluff (Nebraska) Experiment Station. The three agronomists said that a series of irrigated rotation plots had been under investigation for 40 years. The soil from potato plots in these rotations was studied in an attempt to evaluate soil structure by determining the stability of soil aggregates in water.

During the last seven years of the 40 years of cropping, the average yields of potatoes were 62 bushels from continuous cropping, 145 bushels from continuous cropping, 145 bushels from the three-year rotation, and 297 bushels from the six-year rotation.

The large differences in the yields of potatoes were due partly to better soil structure caused by the rotation, the agronomists reported.

* * *

A cataloging of principal Arkansas soils according to their mineral content, designed ultimately to improve fertilizer recommendations, is under way at the University of Arkansas, it was reported by Dr. C. L. Garey, of the agronomy staff at Fayetteville, Ark.

He said the clays were first divided into two groups—coarse and fine—and then studied with the aid of x-ray and other techniques.

* * *

Heavy applications of nitrogen fertilizer may affect the composition of bromegrass hay. J. S. Russell, C. E. Bourg, and H. F. Rhoades of the Nebraska Agricultural Experiment Station described experiments in which nitrogen was applied to a sodbound bromegrass field at rates of 60, 120 and 240 pounds per acre. They said that plant samples from plots treated at these rates showed a higher nitrogen percentage at all stages of growth than plants from unfertilized plots.

* * *

Corn may be "starved" for fertilizer yet look healthy. So report F. G. Viets, Jr., agronomist C. E. Nelson, and physical science aide G. L. Crawford studied this fertilizer situation with corn at Washington state's Irrigation Experiment Station, Prosser.

"In one experiment," they found, "corn yields were down 35 bushels an acre from what they should have been. We checked the nitrogen in leaves and found there wasn't as much as there should be for a maximum yield. Yet the plants themselves didn't show the characteristic yellow-tipped leaves which appear when plants definitely don't have enough nitrogen."

These scientists grew their corn on soil that had plenty of phosphorus but not enough nitrogen. They found that the more nitrogen they put on, the more phosphorus appeared in the leaves of the plant. The larger amounts of nitrogen seemed to make it possible for the plant to use more of the phosphorus already in the soil. And the more nitrogen and phosphorus there was in the leaves of the plants, the higher the corn yield was.

In their tests, these men also found that only nitrogen applications increased yields. They tried adding phosphorus, calcium, magnesium, potassium, and manganese. But none of these increased yields.

Fluoride

(Continued from page 45)

cate that a definite health hazard exists in this industry and the concentrations of this element in the analyses of the urine specimens support this fact.

Not enough samples were obtained to statistically illustrate a correlation between environmental air samples and urine specimens between the two types of plants and between the various operations and

MAJOR FERTILIZER MANUFACTURERS PROVE UDET F VALUES

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- Production increases range from 10% to 40%
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Non-hygroscopity of the fertilizers due to the absence of lime nitrate.

Can produce end product in any sized granules desired.

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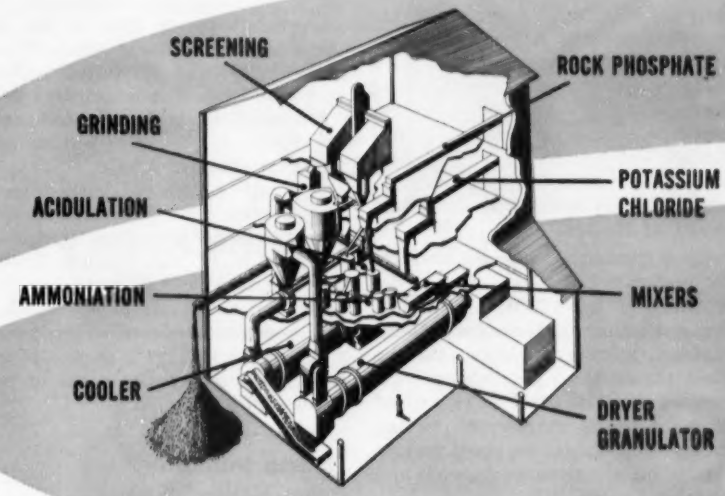

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jobs of the workers within each plant. However, enough samples were collected to conclude that fluoride is a hazard in the commercial fertilizer industry.

Recommendations

The following recommendations are based upon data obtained during these studies. We recommend that:

(1) the Industrial Health Bulletin, vol. 3, no. 5, **Fluorides,** published by the New Jersey State Department of Health, be carefully read by all the management personnel concerned with phosphate fertilizer manufacture. It is noted on page 12 of this bulletin that in paragraph one under **Medico-Legal Aspects,** it is stated that fluorine poisoning is not a compensable disease in the State of New Jersey. However, it is a compensable disease in Wisconsin. Additional copies of this bulletin are available through the Industrial Hygiene Division of the Wisconsin State Board of Health.

(2) a thorough study be made of the acidulation plant in order to determine the most efficient method for controlling the escape of the gaseous fluoride products into the plant atmosphere. It is also recommended that acid plant employees be provided with respirators having chemical cartridges designed for the absorption of hydrogen fluoride and other acid gases.

(3) a thorough study be made of the blending plant in order that the materials can be handled with a minimum of dust generation and that points of excessive dustiness be controlled by local exhaust ventilation.

(4) all plants using ammonia solutions or ammonia gas have a sufficient supply of the emergency type gas masks on hand and that they be placed where they can be most easily reached. The workers should also be carefully instructed in the proper use of these personal respiratory protective devices.

1—**Fluorides.** Industrial Health Bulletin, Vol. 3, No. 5, New Jersey State Department of Health.

2—**Noxious Gases.** Y. Henderson and H. Haggard. Book Department, The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York, pp 135-136.

Hudson Expands New York Office

Hudson Pulp & Paper Corp., according to word from Secretary Sam Lopin, has signed a $2,000,000 fifteen year lease on 25,000 square feet of office space at 477 Madison Avenue, which will give them badly needed space. The building is scheduled for completion this Spring, and Hudson will occupy the ninth and tenth floors.

In announcing this latest step in the Company's expansion program, Mr. Lopin traced the development of the Company from its beginning as a one-man bag manufacturing operation begun in 1900 by the late A. Mazer. The status of the Company today was illustrated by the fact that Hudson now employs over 2,000 people in its three manufacturing plants and its sales offices, and last year reported a sales volume in excess of $40,000,000. The Company's position as a factor in the paper industry is further illustrated in that it is the world's largest manufacturer of gummed sealing tapes and household paper napkins, and a major producer of multiwall shipping sacks, kraft paper, paper bags, and other paper items in the tissue and kraft fields.

Hudson Publishes Paper-Mailing Book

The publication of a new, comprehensive story of modern papermaking has been announced by S. W. Franklin, director of merchandising of the Hudson Pulp & Paper Corp. This new forty-six page book covers the operations of Hudson's newly constructed mill at Palatka, Florida.

Combining photographic illustration with fully descriptive captions, the book is intended to give both the layman and the technically minded, a full understanding of the processes involved in Hudson's manufacturing of paper and paper products.

New Hyster Catalog Available

Now available is a new eight-page illustrated catalog on the Hyster YT-40 Lift Truck. The YT-40 is a 4000-pound capacity model featuring trunnion-mounted steering and pneumatic tires. It is an all-purpose, inside-outside truck. Complete description, specifications and actual on-the-job photos are included in the catalog. Copies may be had free from any Hyster dealer, or by writing Hyster Company, 2902 N. E. Clackamas St., Portland 8, Oregon for Form 1284.

Shell Division Address Announced

In our last issue we mentioned the renaming of Julius Hyman and Co. to be the Agricultural Chemicals Division of Shell Chemical. The new address is P. O. Box 1617, Denver. The new phone is Atlas 8-1516, Denver.

Southern Ag Workers To Meet In Dallas

The 51st annual meeting of the Association of Southern Agricultural Workers is to be held in Dallas, Texas, February 1-3. General sessions on Monday and Wednesday will be in the Baker Hotel, section meetings divided between the Baker Hotel and the Adolphus Hotel.

The opening general session will feature an address by Dr. P. V. Cardon, recently elected director-general of the Food and Agriculture Organization of the United Nations on "Progress and Problems in Southern Agricultural Education."

Farm Chemicals Group Plans First Annual Meet

First annual meeting and conference of the recently incorporated Canadian Agricultural Chemicals Association will be held at the Royal York Hotel, Toronto, Feb. 19.

A number of prominent speakers in the agricultural chemical field are scheduled to appear during the sessions and a banquet will conclude the program at which Hon. J. G. Gardiner, Minister of Agriculture, will be the guest speaker.

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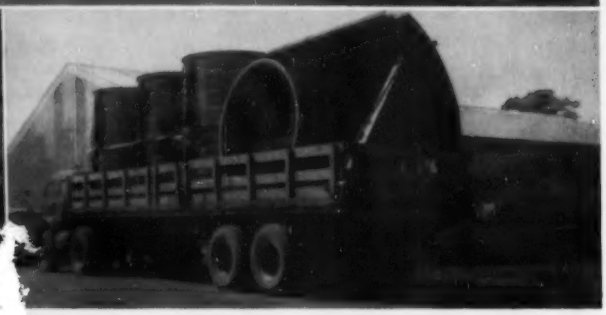


SOUTHERN LEAD NEW PLANT PERMITS 15 TON FABRICATION

The pictures shown above were made at the plant of Southern Lead Burning Company in Atlanta. The new building has just been completed and has enabled this company to fabricate equipment up to 15 tons for shipment by rail of truck.

In addition to effecting faster service and better delivery to customers, the facilities of the new enlarged plant will permit economies in manufacture that will result in lower cost on equipment formerly fabricated on the job site.

Typical of some of the work turned out by Southern Lead Burning Company's new plant are the tanks shown in accompanying pictures loaded on trucks for shipment to such points as Colorado and Michigan. One picture shows steel tanks; the other lined wood tanks. Southern Lead also serves other tank manufacturers in the Birmingham, Atlanta, Chattanooga and Charlotte areas.

The company specializes in the manufacture of lead lined tanks, lead pipe lines, acid filters, lead coils, lead valves, stainless steel tanks, tanks and duct work neoprene lined, etc. Also, lead burning for sulphuric acid plants, rayon plants, paper mills, etc.

Southern Lead Burning Company, which is located at 956 Adamson Street, S. W., Atlanta, has been in business serving the fertilizer industry for the past 8 years and this latest expansion will afford their customers better service at lower cost. William F. Kelly and Joseph J., Kelly, pictured above, founded the company and heads its operation.

Pesticides

(Continued from page 64)

New Pesticide Developed By British Company

Development of a new insecticide which reportedly protects brassica crops against flea beetles has been announced in London by Plant Protection, Ltd., an Imperial Chemical Industries subsidiary.

Called Gammasan, the new insecticide is said to be effective when applied to seeds of such brassica crop plants as cabbage, turnips, and kale before planting.

Chloro-IPC Name Rights Released By Columbia

Columbia - Southern Chemical Corp., which pioneered the development of isopropyl-N (3-chlorophenyl) carbamate as an herbicide to control grasses and weeds on the cotton plantations in the South and originated the name "Chloro-IPC" to designate the chemical name, announced last month that it is relinquishing all claims to the name and offering it for free use by the public.

AM Potash & Chem. Announces New Spray

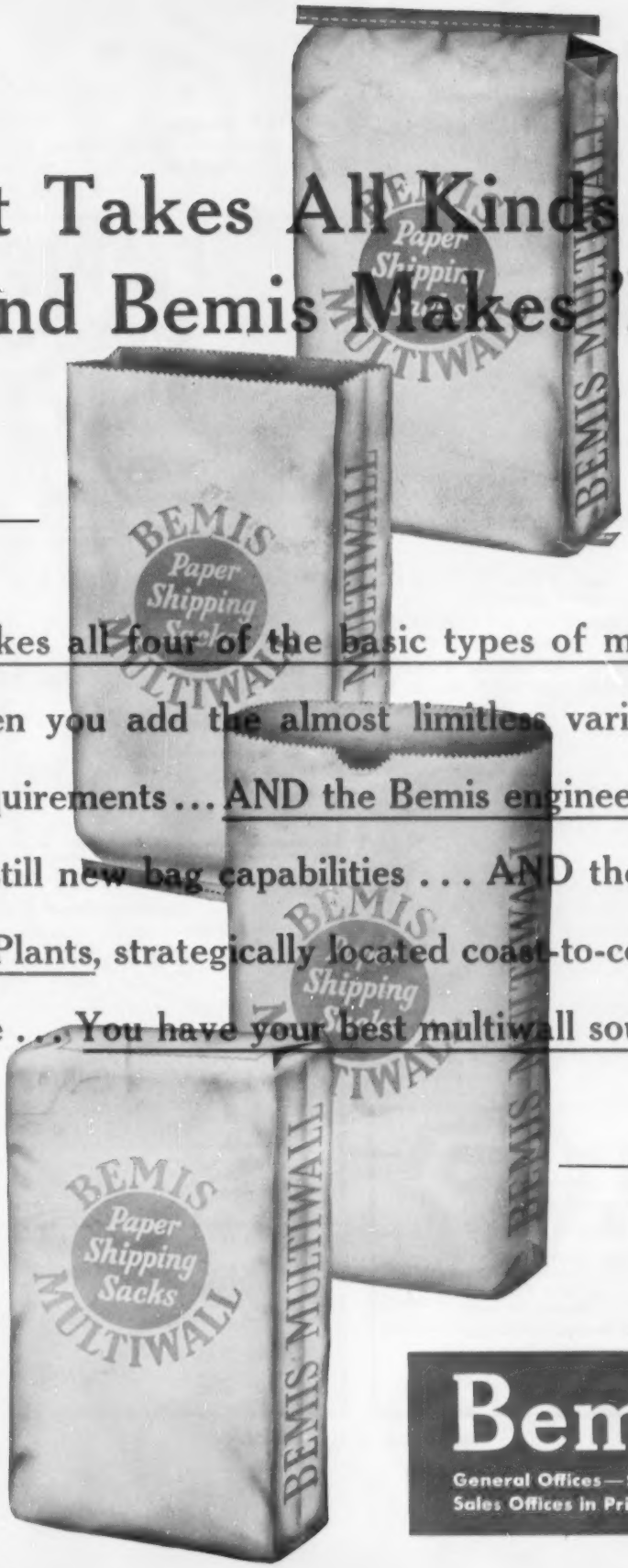
Development of a highly effective toxophene spray insecticide which is economical, easy to apply, and leaves a long-lasting residual deposit has been announced by Eston Chemicals Division of American Potash & Chemical Corporation, In Los Angeles.

The toxophene formulation, called ESTONOX, provides remarkably effective control over such insect pests as boll worm, lygus, cotton leaf worm, thrips, army worm, cotton aphid, boll weevil, grasshoppers, spittle bug, salt marshal caterpillar, sugar beet webworms, pear psylla, serpentine leaf miner (found in beans, potatoes and tomatoes), and such livestock pests as ticks, lice, and horn-fly.

ESTONOX was developed by Eston chemists after extensive research had proven the advantages of sprays over dusts under certain specific conditions.

The advantages of ESTONOX sprays over dust include the fact that they can be applied over a wider range of weather conditions.

It Takes All Kinds...
and Bemis Makes 'Em



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Sewn Open Mouth

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STEEL TANKS FOR SALE: Dished heads—all welded. Excellent for storing liquid fertilizer, chemicals, etc. at Brooklyn, N. Y. (14) 7500 gal., (2) 6000 gal. at Norfolk Va. (3) 5800 gal. at Tonawanda, N. Y. (2) 7000 gal. at Reading, Pa. (9) 4600 gal., (5) 4300 gal., (2) 3800 gal. At Philadelphia, Pa., (10) 13,700 gal., (4) 9150 gal. PERRY EQUIPMENT CORP., 1426 N. 6TH ST. PHILADELPHIA 22, PA.

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Send for Bulletin 200

CLASS 21800 *(left)* **for fast, economical closing of paper bags. Illustrated is Style 21800 H with 5 ft. conveyor and 80600 H sewing head for making tape bound closure. Tape is cut off automatically at each end of closure. Sewing head and conveyor adjustable vertically.**

CLASS 20500 *(above)* **machines are heavy duty, high production units for closing medium and heavy weight bags. Available with power-driven horizontal conveyor, inclined conveyor, or both; or with conveyor transmission unit only, for plant production line.**

STYLE 20100 H *(left)*, **is a heavy duty, high production column type machine designed for use with plant conveyor systems. Sewing head is pedal controlled.**

DUPLEX MACHINES *(right)* **are designed for closing double bags. The first sewing head closes the inner bag; the second closes either the outer bag alone, or both bags together for extra safety. Also recommended for single closures where continuous operation is a must—operator can instantly switch to other head.**

Union Special®

BAG CLOSING MACHINES